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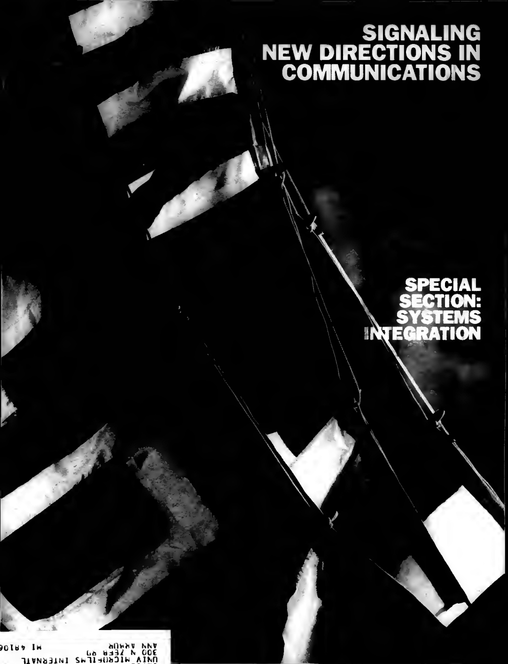

SPECIAL SECTION: SYSTEMS INTEGRATION

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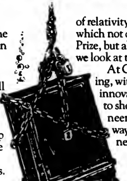
What we learned about networking from Houdini, Einstein and the Blatta germanis.

These aren't your average, everyday R&D resources we agree. But as history tells us, the answers to some of the most complex problems can be found in some surprisingly unusual places.



Jack Of All Trades vs. Master Of One.

Harry Houdini was well known for his overall expertise as a magician, but in escape artistry, he was the specialist.

At Codex, we can't help you out of submerged trunks wrapped in chains, but we can help you out of some difficult networking problems like no other data communications company can.

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(La Cucaracha)

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ABOUT THIS ISSUE

The demand for sophisticated telecommunications functionality has exploded in the last few years, and there's no end in sight. Increasingly, information is being viewed as a competitive weapon and everyone wants access. Faced with a growing number of choices and solutions that remain frustratingly out of reach, users are looking to MIS for guidance and leadership. Keeping on top of the confusing number of communications products and changes in technology is more important than ever but harder to accomplish. It is MIS' responsibility to manage and plan for these widespread changes, and the time to start is now.

GEOFF O'CONNELL PHOTO NAUTICAL ACCESSORIES COURTESY JAMES BLISS MARINE INC

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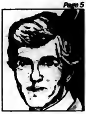

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The First Stat Mux With A Built-In Spare.

Racal-Vadic's 7400 Series: leased-line multiplexing with dial back-up.

You wouldn't drive around without a spare tire. Yet every day you risk losing valuable time and data by relying on a network of multiplexers connected only to leased lines. With most muxes, when a leased line drops, communication stops dead.

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And the dial-up spare isn't the only thing that helps a 7400 keep your data on the road. The 7400 Series also offers an optional "Help!" modem, a built-in Bell 103-type device with automatic dial and answer capabilities. If a problem develops with the mux, the "Help!" modem automatically calls a preset telephone number to let you know. You, or a service engineer, can also use the "Help!" modem to remotely access the mux's supervisory mode.

Your 7400 gets your data moving sooner too. No other mux is as easy to set up and operate. You can use the "Help!" modem to do a soft-option installation on your own, or let Racal-Vadic's technical experts do it for you over phone lines. And you can even start transmitting on the switched network while you wait for your leased line to be installed.

The 7400 Series is also an all-terrain vehicle. It's compatible with H-P and Wang protocols, and ready to work with whatever you want to connect. And that includes every mini on the market.

The 7400 Series is extremely modular. The basic 4-channel model can be field-upgraded to 8, 12, or 16 channels just by adding 4-channel cards to the original box.

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CIRCLE READER SERVICE NUMBER 35

COMMUNICATIONS VIEWPOINT

EDITORIAL

The MIS Connection

Connectivity is fast becoming the No. 1 issue for MIS managers. End users are demanding it, top management is assuming it exists and vendors are not providing it. MIS managers are caught in the middle, and while they wait for technologies to evolve, they must work with a patchwork of products and solutions in hopes of linking their myriad of incompatible equipment.

A wealth of technologies has emerged in the last few years adding to the confusion of choosing a telecommunications strategy. Gateways, micro-mainframe links, LU 6.2 and bypass technologies like microwave and satellites have become more economically feasible for organizations. However, many of these technologies appear better on paper than in practice because they are so new and lack some major elements needed for complete systems integration. IBM, for instance, finally announced its Token-Ring networking scheme, but many parts of it are still missing, and a number of MIS professionals have decided it hasn't been worth the wait.

And while these technologies take their time in developing into full-functioning products, demand is growing for connection among personal computers, between factory systems and the corporate data center and on a software-to-software level. The cry for increased software connectivity comes mainly from users who want their spreadsheets integrated with their word processors or with their data bases. But, again, few software products have been developed so far with this level of communications.

We have arrived at a different set of concerns in our quest for communications solutions. No longer is MIS puzzling about whether to install broadband or baseband. Neither is the choice of token ring vs. star or bus topologies a top priority. Where once the issue was the basic components of a communications system, the question now centers on how the technology will connect to other systems or sites.

As these technologies evolve and are adapted, the need for network management will assume critical proportions; MIS managers must become more involved in this task. It can be their role to investigate, implement and monitor these new technologies as well as to offer guidance to top management in deciding which technologies would benefit the organization and which would not. And while the growing use of multivendor, hybrid systems — different media for different applications and/or users groups — will increase the flexibility and capability of the overall system, it will also add to the confusion and need for management and control.

For the most part we have progressed beyond technical specifications and are looking at the application and integration of products. MIS' goal should be to determine whether the applications fit the business needs and direction of the company.

Ann Dooley

Nirvana Or Nightmare?

INSIDER

Timothy J. Caffrey

Communications, is clearly "in" in 1986. Within the last 12 months the computer industry has been transformed into the communications industry. Vendors emphasize connectivity, networks and integration when talking about their system solutions. If you listen for too long, you even get the sense that they're really delivering something.

At the other end of the market, MIS and telecommunications planners are grappling with issues of network architectures, voice/data integration, distributed applications, security, standards and staffing. As intermediaries, the trade press and consulting community have stepped in to spew morsels of wisdom about what it all means.

According to industry prognosticators, the new focus on communications is firmly entrenched. International Data Corp. (IDC) of Framingham, Mass., for example, has projected that the market for communications services and equipment will grow at an annual compounded rate of between 10% and 14% through 1989. Underscoring such projections, both vendors and users have left little room on the planning agenda for non-communications-related issues.

The overriding focus on communications has produced two sets of concerns. First, it is easy to commit to broad concepts and objectives in communications architectures while underestimating the complexities of implementation. Second, the commitment to making progress in communications often involves diverting resources from other areas of informations systems deployment. However, these shunned areas may in fact offer opportunities for a more tangible and immediate return on investment.

Consider a typical Fortune 1000 company or large federal agency with a significant ongoing investment in information systems. At one such organization, the "network or die" commitment was justified by the proclamation that "a stand-alone personal computer is as useful as a stand-alone telephone." That is a great rallying cry for vendors looking to create new markets but not necessarily for firms concerned with the bottom line.

The result of such a commitment is often unrealistic and uninformed optimism about the likelihood of near-term networking success. In many instances, the clamor for full connectivity subsides to silence when the issue of cost-justification is raised. All too often the hard return on investment analysis doesn't have a seat on the communications bandwagon.

While the tough questions remain unanswered (and perhaps even unasked), many planning groups also seriously underestimate the complexity and the time frame for implementing their schematic network objectives. Most now speak the languages of IBM Systems Network Architecture and International Standards Organization Open Systems Interconnect, but few are willing to face the fact that progress in the development of standards will take place in five to 10 years rather than in two to three.

These unrealistic and expensive expectations are not all self-induced. The press and trade shows leave one with the distinct impression that most companies are moving quickly toward network nirvana. For those who are not moving aggressively to build gateways and bridges between systems, this impression can incite a chilling fear of being left behind.

In fact, the fence sitters have little to fear. IDC's recent survey of large organizations showed that very few have moved beyond pilot tests of local-area networks. Distributed data bases, despite vendor claims, are a pipe dream. Most personal computer networks shipped last year are probably still in their boxes.

In light of these observations, the most valuable network acquisition advice in 1986 may be to buy time. Look for opportunities that have been snubbed in the network scramble. Stand-alone PC productivity may be one such opportunity. Much could be accomplished if half the energy spent on redrawing network schemas was invested in building a base of more effective PC users. The big payback comes when the network infrastructure is finally put in place — and you have something valuable to communicate.

Caffrey is vice-president of Office Automation Services for International Data Corp. in Framingham, Mass.

dB
BY RICH TENNANT
YOU KNOW dB, SOMETIMES I CAN'T BELIEVE HOW SECOND NATURE ALL THIS COMMUNICATION EQUIPMENT HAS BECOME TO ME.
I MEAN WHO'D EVER THOUGHT I'D ONE DAY BE ABLE TO SAY THAT I DIALED IN A MODEM,...
...VIA A STAT MUX, INTO A DEDICATED PORT ON A COMMUNICATIONS PROCESSOR,...
...BY ACCIDENT?

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CIRCLE READER SERVICE NUMBER 37

Newton: Postdivestiture Telecom Industry 'A Mess'

Harry Newton is president of Telecom Library, Inc., a New York-based telecommunications marketing and consulting firm. Always controversial, Newton has been involved in the communications industry for nearly 20 years as a consultant, writer and lecturer. He spoke to Computerworld Focus *senior writer Stan Kolodziej about some of the trends shaping the communications industry.*

What changes do you see driving the communications industry today?

The cost of short-haul communications is going through the roof. We've seen circuits go up in cost from $5 to $50 a month. The telephone companies are hitting businesses without giving clear-cut reasons why they are raising the rates. That's driving a tremendous explosion of T1 networks. Companies are jumping into T1 because they can save money, and there are better T1 switching systems on the market. T1 also gives users the flexibility to set up a data link to a certain location within hours, instead of waiting for days or months for the telephone company to switch circuits.

The whole thing encourages the bypass business, which is the fastest growing sector of the telecom industry.

Are companies getting the kind of telecom service they need?

No. Since divestiture, the professional quality in telecommunications has been put back five years. Users have no idea who to point a finger at if something goes wrong. In the days of one-source shopping you knew who was responsible for a problem. It's chaos out there now. The data processing profession has matured and progressed. The telecom profession has slipped in expertise.

The key telecom skill today is called managing your vendors. That basically means knowing who to call.

Where does that leave users?

User companies are becoming more like Baby Bells; they're taking more command and responsibility for their own telecommunications facilities. In-house testing of circuits is growing like crazy. I've seen telecom managers carrying bug sets, the kind telephone workers use to test lines, and there is a market growing for more sophisticated equipment that users need to do their own troubleshooting. The job of telecom is becoming more a business, and the technical side is too important to leave to the suppliers.

There is also an awareness in businesses now that networks can give a real competitive edge. Companies are allowing customers to plug right into their data bases to handle transactions, retailers are using networks to give instant shipments and orders, banks have their [automated teller machines], manufacturers can do just-in-time [work]. I mean the list goes on and on. Companies already have the universal data terminal, the IBM PC, and the universal voice terminal, called the telephone. The two are now being used as competitive weapons on networks.

That competitive edge obviously includes bypass.

Bypass is very real. Actually it should be called short-haul communications, not bypass. The telephone companies coined]the word] bypass specifically to have a pejorative connotation, like interconnect, to make it seem the user was doing something vaguely illegal, immoral. The telephone industry isn't stupid. They're also doing bypass. They want to keep all the business they can.

Q&A

Harry Newton

> ❞
>
> *The [DP] profession has matured and progressed. The telecom profession has slipped in expertise.*

Users are also using bypass to leverage their negotiations with the telephone companies. The threat of bypass, the threat of buying their own switching equipment, can do wonders for increasing response and service for users.

Are there any bypass technologies that might fade away in a few years?

No. Microwave, satellite, CATV and fiber optics will always be important. Telecommunications is a different industry than data processing. Computers become obsolete, but nothing becomes obsolete in telecommunications. We're still using some switching technology that's 100 years old. Things are meant to interconnect in this industry, and that means they'll be around for a while. That includes bypass.

Apart from the deterioration in telecommunications expertise, what other legacy has divestiture left us?

Price wars. Prices in almost every area of telecommunications have come down in the past few years. The telecom industry has lost more money in the past few years than any other U.S. industry, about $3.5 billion. In the past four years the telephone industry has fired more than 150,000. That's an enormous number. Imagine, at one point AT&T employed 1 million people.

Where did these people go? Some became consultants, some drifted to independent telecom companies, but many others left the industry altogether, and that has had a profound impact on the level of remaining skills.

The most desperate need in the telecom industry today is management skills, and that is most evident in the long-distance carriers. The expertise and intelligence of the telecom industry was based on a regulated environment, and skills were not up to the competitive standards following deregulation.

Has that affected the relationship between MIS and telecom managers?

The much-vaunted combining of MIS and telecom just isn't happening. True, MIS has taken over telecom, but that just means there are more people reporting to MIS executives. About 90% of MIS time is still spent on DP functions because it's more interesting. DP vendors are basically more responsive, and the frustration level in getting something done in telecom is high. You can't blame MIS. Budgeting telecom is almost impossible. You can't figure out when the next tariff increase will happen. MIS is used to open markets. They try to equate the professionalism of the DP industry with telecom and can't figure out why a simple software problem could take so long to solve.

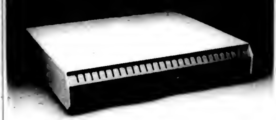
Are there positive signs in all this?

Of course. The other side is a huge explosion in entrepreneurial activity, new companies coming into the field. It's a fact that there have been more new venture capital companies formed in telecom recently than in the DP industry. There is more willingness on the part of telecom suppliers to negotiate deals under the table. The tariff structure is only a starting point. Mind you, the deals are struck mainly with large corporations — smaller companies are still being shafted. But for those larger companies willing to negotiate long-term deals, the telecom world is their oyster. Don't think that Michigan Bell wouldn't kill to keep its business with General Motors [Corp.]

I'm also encouraging DP people to go into this business. We need more DP expertise in telecom.

I want to make sure I conclude on a positive note. The telecom industry is a mess. But if it weren't a mess, the opportunities wouldn't be there.

Ethernet Is Now
Available On Broadband



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CIRCLE READER SERVICE NUMBER 33

COMMUNICATIONS VIEWPOINT

Don't Leave The World Out When Planning Network Needs

MANAGER'S CORNER

Jim Young

Most organizations plan their data communications networks by carefully analyzing sources and uses of data then building the delivery systems to meet these needs. Unfortunately, most such analyses do not go far enough. They typically stop at the boundary that defines the organization and leave out the rest of the world. An analysis of a firm's information needs will show a dependence on bringing in data from outside the company and delivering other data beyond the organization's walls. Therefore it is appropriate to consider some of the following opportunities for outside sources and uses of data in your communications plan:

Customers. Vendors have developed a lot of innovative applications that permit customers to order products on-line over proprietary and other networks.

Other important customer services include order status checking, service systems for distributions and delivery scheduling for just-in-time manufacturing. Depending on the information needs of your marketplace, you may find it advantageous to define a networking link to those you serve.

Vendors. Just as you offer customer networking to remain competitive, your own suppliers are doing likewise for you. Be sure to consider all of your vendors, including suppliers of services, shippers and your bank. New diagnostic techniques permit problem isolation and correction with remote-access systems. Proprietary technical research can be performed on-line to your hardware vendor. You can also apply routine system upgrades through a network.

Employees. A firm may not be well served by restricting network use to the confines of a company building. Broadening the scope of a network can enable employees to work at home or can allow a firm to deliver up-to-date information to a sales representative on the road.

Sources of data. A specialized class of vendor is the seller of data. As a company becomes dependent on a specialized data base, an on-line link may be the only way to handle this efficiently. Data bases of stock market transactions, shipping rates and tax tables are currently acquired routinely from outside. In the future, companies will make increasing use of external data such as mailing lists, market pricing information and credit information.

Government. Much data base information is available from government sources. Moreover, generalized data is not the only data available. For example, the Freedom of Information Act is a means to get on-line access to selective, pertinent data. While magnetic media is sufficient for today's bulky, time-insensitive needs, government needs in the future may be best served on-line.

You should also consider another series of questions concerning link users. How far along is the target group? This will determine how early you can move. How sophisticated is this group? Can the group master new ideas without help? Will it even want to? How much leverage do you have with this group?

Armed with answers you are ready to start laying out the steps for your communications plan. Perhaps some of the following items will be included:

- Standards. Check the specific performance and functional needs of your application, and make sure the selected standard supports them.
- Data. Begin defining the data to be communicated. It may take you and the other party in the link some time before this data is positioned and sanitized for external communications. In the meantime, in-house applications can grow around the planned interface.
- Procedures. Procedures may be clear from the nature of the applications, but you should take into account frequency of exchange, verification of transmission, initiation, problem resolution, treatment of proprietary data and other details. For external data exchange, you must bridge the wide gap in expectations, practices, habits and cultures with early and specific exchanges.
- Dialogue. Once procedures are laid out, they should be shared with the outside partner. The ultimate goal is a set of interlocking and orchestrated communications plans among the networked parties.
- Issues. Networking is not without its areas of concern; this is especially true when dealing with external communications. Give special attention to the topics of security, network fine-tuning, concessions made among users of the network and disaster recovery.

External, on-line data exchange can serve to speed up operations, eliminate intervening manual steps, reduce operating expenses, strengthen and improve relations with others and even provide competitive business advantages and proprietary positioning. All it takes is some foresight, leadership and a communications plan to make it all happen.

Young is principal and the director of consulting for Authur Young & Co., Worcester, Mass. He has worked in the industry for 15 years.

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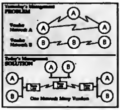

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CIRCLE READER SERVICE NUMBER 34

Learn By Doing: Academia Struggles With Telecom Demands

ISSUES AND ANSWERS

Robert D. Gilges

While the demand for improved and expanded telecommunications services has increased in virtually all industries, colleges are being swamped by increased usage as well. It has become vital for schools to plan and manage their telecommunications resources and expenses to remain competitive and continue to attract quality students and faculty.

There are two major and conflicting issues confronting universities in relation to their telecommunications service and equipment. The first is to meet the demand for increasing computer services and provide access to these services for faculty, staff and students. With the price of personal computers dropping, more and more students are bringing them to school and demanding access to campus data bases. This places a burden on the school administration and computing staff to provide some type of local-area network. This is often through a private branch exchange, whether or not it is capable of handling the additional load.

The second issue is managing and controlling costs for telecom services while coping with increased demand.

The technology of telecommunications equipment is undergoing rapid change. The industry is moving from analog switching systems to digital switching systems that allow the simultaneous transfer of voice and data through the telecommunications network over the same facilities. Universities must position themselves to act in a proactive management role across the board to remain competitive, including in the area of telecommunications. Some, such as Duke University of Durham, N.C., are even installing modern central offices to provide both voice and data transmission for the entire school.

Smaller institutions also recognize the need to provide students and faculty with easy access to more information and computing resources. Drake University in Des Moines, Iowa, has a task force of faculty, administration and computing staff working to install an integrated voice/data network to serve its campus.

The growing use of data applications and the need to allow for universal connectivity to the various data systems will eventually force all schools to formulate a telecom plan. Schools must come to terms with how the information resources available in the market today can best help to support and benefit faculty, staff, students, data processing operations, library and reference needs.

The first step in developing a strategic plan for telecommunications is to conduct a needs assessment. A university must determine its present needs and its future requirements. Second, the school should conduct an inventory of existing voice and data equipment. Next, a faculty and staff user survey should be conducted to determine the level of satisfaction in current voice and data services and equipment. Future requirements both in applications and equipment should be reviewed with users. A review of all costs associated with voice and data service equipment should be made.

A telecom manager can be essential

If there is no telecommunications manager at the university to take care of such a plan, the university should hire one. This will help deter the problems associated with a lack of such a person, including the influx of dissimilar data devices, voice services that begin to degrade and uncontrollable costs.

Information distribution plays an integral part in the educational system. Universities have been the forerunners in the information industry especially because their libraries are in the business of creating and storing information. There is the need for more effective and more efficient library methods and the ability to send information from one location to another electronically.

The telecommunications needs not only of libraries but of the university system as a whole will grow rapidly during the next few years because functions now conducted manually (such as updating grades) are being automated, with the faculty having access to computers.

Many universities have implemented a campuswide information distribution system. Implementation of such a system allows the distribution and access of information to areas that geographically would be difficult or impossible to get to without an integrated system.

The features and capabilities of a unified network include increased reliability, better transmission quality, user convenience and accessibility. The improved management control and administration of facilities along with the joint use of resources results in reductions in communications costs. With a strategic plan for voice/data services, a school can find itself going to the head of the class.

Gilges is partner in charge of Peat, Marwick, Mitchell & Co. Information Systems Services Practice. This article was written in conjunction with Rod Nichols, a senior manager in the Information Systems Services Practice, Chicago office.

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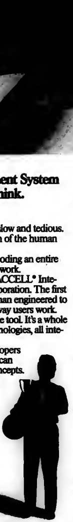

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CIRCLE READER SERVICE NUMBER 25

VIEWPOINT

It's Not Whether You Win Or Lose, It's How You Play The Game

READER VIEWPOINT

P. J. Michaels

Since the beginning of time, mankind has been wary of knowing too much and suspicious of those who do. These archetypal fears, passed down generation unto generation, are present today in the following game called Ignorance is Bliss.

The fears are represented in the game's two prototypical players — the Mushroom Farmer and the Ignoramus. [Similiarity to real persons or events is purely coincidental. — Ed.]

Object of play. The Mushroom Farmer is a supervisory player who directs the work of a project team. The farmer's object of play is the same as his motto for maintaining project direction: Keep 'em in the dark and feed 'em manure.

The Ignoramus is the model team player. By nature, this player has no curiosity ("What I don't know won't hurt me") and no desire to acquire any. The object of play for an Ignoramus is to work undisturbed under the artful direction of a Mushroom Farmer.

Game situation. The situation is a project of three months or longer, with three or more team players under the direction of a Mushroom Farmer.

The best project for this game will have no coordinated requirements, milestones or checkpoints and no status reports, just a critical end date by which all tasks must be completed.

A typical game situation for *Ignorance is Bliss* is a major conversion project such as ISAM to VSAM; VSAM to IMS; IBM to Burroughs Corp.; Burroughs to IBM; an antiquated, homegrown system to a new software package; an antiquated software package to a state-of-the-art, homegrown system; or any old system to any new system.

These conversion projects have a tendency to resemble small factories, with all hands working independently on piecemeal production. For example, after installing on OS test environment, a typical DOS-to-OS conversion project may require converting more than 300 programs, 85 job streams and 25 files to OS, not counting documentation and run books — all to be completed in time for publishing the company's next annual report. The typical DOS-to-OS conversion project will always miss at least two issues of the annual report.

The Mushroom Farmer must supervise three or more players; two players won't work. They are bound to get to know each other unless at least one is an Ignoramus. In this case it doesn't even matter if they play racquetball together.

The ideal player mix will have no more than three department employees (preferably two of whom have never been on break together) and no more than two contract programmers from any one firm (preferably one of whom is a new hire).

How the game is played. *Ignorance is Bliss* is always controlled by the Mushroom Farmer. When the farmer loses control, the game is over. For example, if a player is able to meet with the Mushroom Farmer and ask for a team meeting because "it appears that no one knows what anyone else is doing on this project," the farmer must either counter the play to prevent a meeting or relinquish control of the game.

To retain control of the game, the Mushroom Farmer may make any one of the following counter moves:

- Explain that a team meeting is not possible until the Mushroom Farmer has met with the DP manager to review the overall direction of the project.
- Explain that a team meeting will not be held because the project is likely to be reorganized.
- Remove the player from the project giving the DP manager such reasons as "the project is currently overstaffed," "the player's analytical or technical skills cannot be used during this phase of the project," "the player is not able to get along with team members," or, "the player is a troublemaker."

Besides executing these countermoves, the Mushroom Farmer controls the game by complying with the following principle rules of play:

- Project orientation is always omitted from the task plan.
- Background material and general requirements are never compiled as formal documentation.
- New players are never introduced as they come on board the project.
- Project memos and status reports addressed to DP management are filed as personal correspondence.
- Project meetings may be scheduled but are always canceled.
- Player assignments are handwritten notes or are given out verbally.
- No documentation is required.
- All programs and test files are password protected.

As you can see, *Ignorance is Bliss* is played for the enjoyment of the Mushroom Farmer. If you find yourself in this game situation (unless you are the Mushroom Farmer), get out of the project soon. It's no fun to play in the dark.

Michaels is an Illinois-based free-lance writer and author of the book King of the Mountain, A Compleat Guide To The Games People Play In Data Processing.

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CIRCLE READER SERVICE NUMBER 26

COMMUNICATIONS NEWS

Telecom Industry Afire

TELECOM UPDATE

The communications field is hotter than hot these days.

Interest in networking has broken through the communications arena into the realm of the information processing industry, and recent trade shows reflect this trend.

At PC Expo, communications and microcomputer vendors showed business users how they could connect their personal computers to mainframes, minicomputers and micros., And at the 1986 National Computer Conference, IBM announced enhanced communications for its System/36, 38 and Personal Computers. IBM's enhancements were largely its answer to users' demands for better links between product lines.

Users have not been the only motive behind recent IBM product introductions, however. The company has also been responding to Digital Equipment Corp.'s large installed base of Ethernet machines. IBM's answer is three adapter cards for the RT PC, which allow the machine to connect with IBM Token-Ring and Ethernet-based networks. In doing so, IBM has given the RT PC another key to the engineering and scientific market — an area in which DEC has held firm ground.

■

When IBM sets a standard, independent vendors are quick to follow — and oftentimes excel. IBM Advanced Program-to-Program Communications (APPC), featuring LU 6.2 and PU 2.1, the cornerstones of IBM's peer-to-peer communications (see chart), has been *the* topic among computer companies and independent communications vendors.

Not only do LU 6.2 and PU 2.1 allow non-IBM computers to talk to IBM machines, they permit non-IBM computers to talk to each other on a peer basis. As a result, independent vendors see a potential market in users with personal computers or workstations that frequently communicate with each other.

Three vendors that compete closely in this market are Systems Strategies, Inc. in New York, Rabbit Software Corp. of Malvern, Pa., and The Orion Group in Berkeley, Calif. All three companies provide APPC facilities for Unix-based computers. All three are quick to volunteer that they can also move these facilities to other operating systems. These vendors said they intend to take advantage of the fact that they can offer LU 6.2 on a micro such as IBM's own Personal Computer AT, whereas IBM does not yet offer APPC on any machine smaller than a System/36.

While Rabbit, Orion and Systems Strategies are ahead of IBM, they may be ahead of the users as well. Though all three vendors have had their products out for at least six months, most of their revenues appear to be coming from their other communications products, including the IBM 3270 emulation that APPC is eventually expected to displace.

■

Version 1.0 of the X.400 Message Handling Standard protocol was finalized recently, but analysts and vendors contend that this is only a first step.

Developed by a special interest group within the National Bureau of Standards, X.400 Version 1.0 was delivered to the bureau and the Corporation for Open Systems (COS) in July. If COS approves the protocols, the standards bureau will incorporate them into the Open Systems Interconnect model developed by the International Standards Organization. X.400 will then be available to companies for testing, implementation and software design.

The Message Handling Standard specifies that all X.400 interfaces between message handling systems use the CCITT X.25 packet-switching protocol. This provides a common base between the local-area network and Ethernet-based networks in the U.S. and European networks, which tend to be based on X.25.

Version 1.0 is open to a lot of interpretation, though, analysts agree. They said that companies developing applications based on X.400 will see incongruities when they attempt to communicate with other vendors' products.

Realizing the need for clearer definitions, the standards bureau is already working on X.400 Version 2.0.

■

At its July meeting, Corporation for Open Systems (COS) announced that it will open its doors to international organizations for the first time. The heavily vendor-oriented organization also wants to encourage user memberships. COS, consisting of 43 vendor firms and 12 user organizations, wants to nearly double its membership by 1987. Half of this number, it hopes, will be users.

The idea behind COS is to encourage open system, multivendor environment products and to become a clearinghouse for standards documentation.

■

A June U.S. Supreme Court ruling on communications equipment offers hope of lower rates for business and residential telephone service customers. But the rash of suits suggest that dream may carry a price.

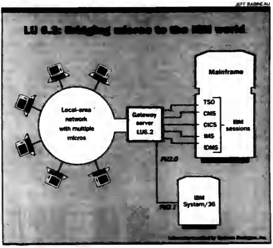
The court's decision upholds the authority of states to set intrastate telephone company depreciation rates and limits the jurisdiction of the Federal Communications Commission over this area. The FCC had introduced accelerated schedules for equipment uses in both interstate and intrastate service so that telephone companies could justify the costs of new equipment.

Some states disagreed with that philosophy. And their public utility commissions set up slower depreciation rates. With the court's support of their jurisdiction over intrastate services, several of these state public utility commissions plan to order the divested Bell operating companies to refund millions of dollars to business and residential customers.

The hardest hit may be Pacific Northwest Bell, which may have to refund between $73 million and $100 million. The refund may backfire, though, the company warned. To cover the cost of borrowing money for the refunds, it said that customers might pay $2 for every $1 refunded.

Others facing large payments are the Chesapeake and Potomac Telephone Co. of Maryland, which is being asked to refund $50 million, and Michigan Bell, which has already agreed to refund $37.7 million. The divested Michigan carrier is also setting aside $20 million in its depreciation reserve account. Facing refunds of between $20 million and $30 million are carriers in Cincinnati, Arkansas and Kansas. The Vermont Public Service Board is demanding a comparatively small refund of between $600,000 and $900,000.

JEFF BABINEAU


LU 6.2: Bridging micros to the IBM world.

Ranked Fourth In 1985 Sales, Apple's LAN Is Not All Talk

Apple Computer, Inc.'s Appletalk is an unconventional local-area network (LAN) that is competing closely with some leading conventional LANs. In 1985, Appletalk accounted for 14% of the LAN connector sales, coming in fourth behind 3Com Corp., Novell, Inc. and IBM, according to research concern Market Access. That translates to about 15,000 Appletalks sold in 1985, said Jan Lewis, president of the Palo Alto Research Group in California.

Lewis noted that the force driving Appletalk sales differs from that of other LAN vendors, however. "Appletalk sales are still primarily driven by the Apple Laserwriter," she said. By contrast, most users of IBM Personal Computers and compatibles are using LANs to connect to a host server, link their micros and share peripherals.

The design of Appletalk is also different from other LANs. "Appletalk has a new level of interface. The design is both elegant and simple. It can be installed without a screwdriver — no mess, no fuss," Lewis asserted. In addition, the cost per node of Apple's LAN is significantly lower than that of other LANs, with Appletalk's price at about $50 per node while other LANs can cost up to $1,000 per node, Lewis said.

However, part of the reason Appletalk costs less than its competitors is that it does not offer the same speed or capacity they do, she observed, "but with the state of office networking today, it's not a major factor." It seems that the force behind Appletalk sales is the need to link Macintoshes with Laserwriters and network servers, analysts agree. They disagree, though, on the extent to which servers contribute to the Apple LAN's popularity.

Apple does not offer its own network server, but some analysts attribute Appletalk's success to the availability of servers, electronic mail and other networking products offered by members of the Appletalk Developers Association. Founded a year ago, the association has brought out more than 20 products that work with Appletalk. A recent example is the Tops distributed file server from Centram Systems West, Inc. Tops uses Appletalk to link Macintoshes with DOS-based computers.

According to Lewis, though, Apple will have to have an Apple label file server to enhance the Macintosh and Appletalk as products in the office. Apple's main market is small business users, and, "these people want to connect their stand-alone personal computers or Macintoshes and add file servers," she said.

Apple appears to have been aware of this requirement from the start, but it has been slow to react. When the firm unveiled its first LAN connector in early 1985, it said that a file server would be announced in the fourth quarter of that year. To date the only network servers for Appletalk are those from third-party vendors. Applying the theory of "better late than never," Apple now plans to offer a file server in 1987. "When I talked with John Sculley, [Apple's chief executive officer,]" Lewis said, "he assured me that Apple would be offering products, not promises, in 1987."

New Technologies, Lower Costs Boost Videoconferencing Market

Videoconferencing may have finally found its market. The availability of desktop videoconferencing systems, ease-of-use dial-up services and decreasing costs for system components have industry analysts and vendors excited about a possible billion-dollar industry by the early 1990s.

George Newman, managing editor of the "Communications Industry Report" at International Data Corp. (IDC), Framingham, Mass., gave some specific reasons why videoconferencing should now score with more corporations.

The first, Newman said, is the widespread deployment of AT&T's Accunet Switched 56 lines (56K bit/sec.) throughout major cities in the U.S. The Switched 56 service will enable videoconferencing users to dial up other users in most major U.S. cities through circuit connections very similar to current telephone services. To boot, the hourly transmission cost per location on the new service will be just twice that of a typical phone call. The AT&T Accunet Switched 56 should be available in at least 60 U.S. cities by the end of 1986.

Another plus for videoconferencing, Newman said, is the recent breakthroughs in video compression technology from companies such as San Jose, Calif.-based Widcom, Inc. and Pictel Corp. of Peabody, Mass. These breakthroughs enable new codecs (coder-decoders, devices that handle compression of video signals) to produce the kind of quality, full-motion video images over 56K bit/sec. speeds that were only available on much higher 300K to 350K bit/sec. data bit rates.

What all this has done is put quality videoconferencing into a downward price spiral.

"The new systems range from $100,000 to $150,000," Newman explained. "That's still expensive but nowhere near the traditional large, centralized systems from AT&T," which can run more than half a million dollars, he added.

Pictel is given the future lead in the 56K bit/sec. video pack. The company has patented its Motion-Compensated Transform video compression technology and made it the core of its new videophone system. The Pictel codec uses two 56K bit/sec. lines to deliver full-motion video with voice and data capabilities and boasts a 2,600% decrease from T1 bandwidth compression levels. The system also uses only 96K bits of bandwidth on the two switched lines. The Pictel codec is stored in a desk-high unit that Newman said packs the power of a low-end Cray Research, Inc. processor.

This middle range, 56K bit/sec. videoconferencing market segment, sandwiched between the large, centralized systems and low-end freeze-frame systems, is expected to be the hottest corporate video market in the next few years, spurred by the Fortune 1000.

Privacy Law Proposed

Electronic mail is private, right?

Wrong. There are no federal laws that protect private networks and carriers, and the government knows it. According to a Congressional Office of Technology Assessments study on surveillance by federal agencies, 25% of the agency departments that responded either had or planned to monitor e-mail, satellite transmissions and computer communications.

The Wiretap Law was enacted in 1968 to protect citizens from government eavesdropping over conventional telephone and mail communications unless there was a suspected felony. However, none of the law's acts was designed to protect private carriers, explained Mary Jane Saunders, assistant general council at ADAPSO, Inc.

To extend Wiretap Law protection, Saunders said, ADAPSO and the Privacy Working Group wrote an initial draft of the Electronic Communications Privacy Act of 1986. "This bill would protect electronic as well as oral communication including e-mail, [and] remote computing," she said.

One example of the new bill's potential impact is the way in which the government obtains information from Source Telecomputing, Inc.'s The Source, an on-line data base service available to users on a subscription basis. Today, if the government wants information a user has on The Source, Saunders explained, it does not supoena him because he would have a right to object in court. Instead, she said, "The government will hit The Source with a supoena, and The Source has no right to object since it's your information not The Source's. Therefore The Source can't raise the constitutional argument against personal search and seisure."

Under the auspices of backing from the private organizations as well as support from the U.S. Department of Justice, the bill is moving quickly toward acceptance. The full Senate is expected to vote on it in September. According to Saunders, "It will be enacted by the end of the year."

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CIRCLE READER SERVICE NUMBER 27

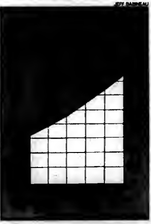
Value-Added Network Mart Sluggish

The U.S. value-added network market hasn't been quite the hot area that everyone predicted a few years ago. Some analysts were targeting market growth of as much as 30% to 40% per year, but reality has brought that figure down to a sober 18% growth rate, according to International Data Corp. (IDC), a Framingham, Mass., research firm.

Simply put, value-added networks comprise three elements: a mainframe computer at a central location; digital switches and communications equipment to route data through coaxial cable, telephone wire, fiber-optic cable, even satellite transmission to remote locations; and software applications to run everything.

Pam Powers, senior analyst at IDC, said the reasons aren't quite clear as to why value-added networks haven't lived up to expectations.

"It takes an incredible amount of network expansion. [Value-added network] providers have to be geographically dispersed, and they are under pressure now to put in better equipment, such as V.32 modems, for higher speed data service. It's a great drain on resources," Powers said.


JEFF BARBEAU

Traditional value-added network providers such as GTE Telenet Communications Corp. and Tymnet/McDonnell Douglas Network Systems Co. have been drifting away from their mainstay time-sharing and information services and providing more corporate data communications services.

The growing base of corporate data users is pushing value-added network suppliers to improve throughput on their networks and replace slower switching equipment.

To increase business, according to Powers, value-added network suppliers will have to provide large-scale users with more specialized, vertical software applications.

Another market factor involves divested Bell operating companies that, in the past year, have been coming into the value-added network picture using packet-switched networks with value-added services and targeting their large telecommunications customers for business. These operating companies can offer links from their own local switched value-added networks into long-distance, value-added network services.

A case in point is Conn Net, a value-added network offered by New Haven, Conn.-based Southern New England Telephone Co. Starting operations in March 1985, Conn Net is a local packet-switched network, the first such local network in the U.S. providing packet-switching capabilities as well as X.25 protocol processing for asynchronous and bisynchronous communications.

Conn Net will also soon be offering X.75 protocol conversion for more advanced network-to-network communications, something more traditional value-added network providers such as GTE Telenet and Tymnet already provide.

Barry O'Brien, district manager for packet switching at Southern New England, said that Conn Net came about under some unique circumstances. As an independent carrier the telephone company was granted a waiver to Computer Inquiry II, not having to abide by the separate operating company subsidiary requirements given by the Federal Communications Commission.

Connecticut is also one of the few states that falls entirely within one Local Access and Transport Area.

Southern New England has managed to garner some big users. Travelers Insurance Co., for example, is using Conn Net to transfer claims data across the state to a host computer in Hartford, Conn., as well as testing telecommuting work for some of its agents.

Southern New England has also contracted with the Tymnet/McDonnell Douglas and ITT to have users access their Tymnet and Worldnet value-added networks through Conn Net. The divested Bell operating companies see a good thing in Conn Net and are expected to jump in with their own local access value-added networks.

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CIRCLE READER SERVICE NUMBER 21

Teleports Supply Users With A Long-Haul Services Alternative

Teleports are the telecommunications equivalent of airports, and the idea is really taking off.

Located near urban centers across the U.S., teleports provide long-haul voice, data and video communications via satellite links to national and international locations.

Corporations "are finding greater needs to distribute information to customers and remote facilities," explained David Rubin, a telecommunications analyst with Arthur D. Little, Inc., Cambridge, Mass.

There are other benefits, too. Teleports are aimed at large corporate customers located in metropolitan areas where land for long-haul command and control operations is at a premium. Earth station and terrestrial microwave facilities also require expensive installation and maintenance costs and are subject to municipal regulations and constraints. Teleports can relieve corporations of these responsibilities and provide them with time-sharing options to defray communications costs.

Getting to the teleport from your office could be a problem, however. Users could bypass the local phone lines and install fiber-optic cable or microwave links into the teleport, though many of the divested Bell operating companies are now willing to provide these same link services to teleport users to avoid losing bypass business.

David Olson, president of the Houston International Teleport, said there are good reasons for the divested carriers to work with, and not against, teleports.

Until recently, Olson said, the divested carriers "couldn't send traffic across a Local Access and Transport Area unless they went through AT&T. Now they can go through teleports. That additional traffic can also mean additional revenues for the [divested carriers]. Not only that, but teleports can be their long-distance carriers to Europe."

Not out of the woods yet

Teleports are still not out of the woods, however. A recent decision by the Federal Communications Commission has given AT&T permission to offer two new services, including Megacom, a lower rate tariff, that could promote bypass of local telephone networks. Through Megacom, AT&T might be able to offer bypass through private-line services from customer premises. It could ultimately tell teleport operators they were no longer needed.

Teleports are also still as much a real estate concern as a telecommunications business, requiring purchase and development of large tracts of expensive land located near urban areas.

But teleports appear to be doing fine. The American Teleport Association, based in McLean, Va., lists 22 teleports currently in operation across the U.S., with about eight more in various stages of construction.

Frost & Sullivan, Inc., a New York consulting and research firm, sees the future of teleports through bullish eyes. The company predicts there will be a minimum of 200 teleports in operation in the U.S. by 1995.

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Norman Farrar
Production Programming Manager
Southeastern Newspaper Corp.

Carlos Weaver
Computer Specialist
Technical Services Division
U.S. General Services Administration

ILLUSTRATIONS BY KEVIN CONKLIN

LANs: The

• BY • REBECCA • HURST •

Local-area network (LAN) users have two similar characteristics: They are generally happy with their LANs, and they have little else in common.

These users have different needs, different network schemes and different reasons for their satisfaction with LANs.

Theoretically, local-area network users can be divided into two categories: those who use personal computer LANs and those who use general-purpose LANs, according to Louise Wells, an analyst for Dataquest, Inc. in San Jose, Calif. PC LAN users, she said, want to avoid playing floppy frisbee.

"They want to communicate with each other and share a common data base, applications and resources — such as a modem — from their desk," she explained. "They don't want to carry floppies to another PC."

People may also use the PC LAN as a less expensive way to access a network through an IBM Systems Network Architecture (SNA) or X.25 gate or a mainframe, she added. "That way they can share one or two ports vs. 10."

General-purpose LAN users are trying to provide a more logical communications path for their minicomputers and terminals, Wells observed. Previously, these users had terminals connected directly to the host, and a terminal had to be rewired every time it was connected to another computer. When all terminals are linked to a network rather than a host, they can serve as a universal workstation that can access any computer or device on the network, she noted.

In a *Computerworld Focus* interview with corporate users, two seemed to fit into the PC LAN category, and another matched the general-purpose model. A fourth defied any distinct label.

For more than two years, Southeastern Newspaper Corp., based in Augusta, Ga., has had a LAN that closely fits the PC scheme. The newspaper publisher has eight installations of IBM PC ATs linked to a Pronet net-

Ken Robinette
Supervisor of Systems Development
Amoco Production Corp.

Clair Althouse
Director of Information Systems and Services
VLSI Technology, Inc.

Users' Report

work from Proteon, Inc. Each network installation has between 23 and 100 PC ATs.

"Reporters use PC ATs instead of terminals," explained Norman Farrar, the company's production programming manager. "Then copy is sent over the network to a PC that drives a typesetter."

One advantage of the Proteon network, he pointed out, is that applications running on the network are not affected by the number of CPUs. "You can use the same system for 23 or 100 copies. To add a station, all you have to do is add a PC."

Rather than moving up from an office of disconnected PC ATs to a PC network, Southeastern moved down from centralized minis. "We were hoping to solve the problem of downtime on the central computer," Farrar said. "At that time, we'd have a newsroom of 20 to 40 people unable to work because the central computer was down." With the PC network, he noted, if one computer has a problem, it does not interfere with the others.

Another user that fits the personal computer LAN scenario is the U.S. General Services Administration (GSA) in Washington, D.C., which has been using a combination of microcomputer networks since late 1983. The GSA has Ethernet-based networks, Corvus Systems, Inc. Omninet and Fox Research, Inc. 10Net connecting IBM PC XTs and ATs and various Convergent Technologies, Inc. microcomputers. "We are in the process of connecting these networks to a [Digital Equipment Corp.] VAX and a [Burroughs Corp.] 7800 mainframe," said Carlos Weaver, computer specialist for GSA's Technical Services Division.

"We also have a Convergent C3 Model 230 serving as a network that resembles token ring," Weaver added. "The C3 isn't meant to be used as a network, but it has some communications capabilities, so we have it talking to a [Honeywell, Inc.] system."

The GSA has more than 100 computers on its networks and is ordering about 50 or 60 more, Weaver estimated. Most of the

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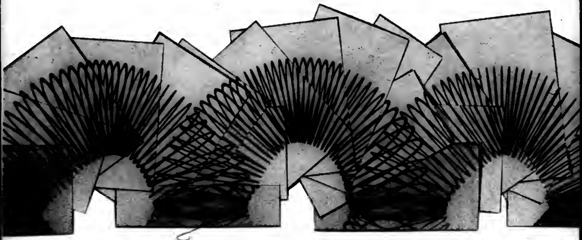

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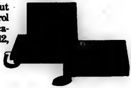

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USER SURVEY

communication between these systems is micro to micro, he said. "Less than 20% is micro to mainframe."

Weaver said the GSA chose its network scheme for the communications facilities including Chat (one keystroke access between stations), electronic mail, calendaring and bulletin boards. "We set it up at the executive level first to handle time-critical files and to improve communication between managers."

The primary applications on the network are financial spreadsheets, a personnel data base and word processing. Word processing also serves a communications function, Weaver asserted. "We have optical readers, and we transfer the information from the reader to word processing," he explained. "Then we transmit it across the network to the individuals who need it. This reduces paperwork and paper consumption and eliminates some of the redundancy."

Communications is also important to VLSI Technology, Inc. in San Jose, Calif. The semiconductor company has had a general-purpose network since the company began in 1982. It uses an Ungermann-Bass LAN to hook approximately 700 terminals to six VAXs and two Hewlett-Packard Co. System 3000s.

In addition, VLSI runs Decnet between the VAXs and HP's DS/3000 network between the HP 3000s. This configuration allows each terminal to connect to any VAX or HP 3000 on the network and transfer data between any hosts.

In addition to computer design applications, VLSI uses e-mail on its network. "We were actually pushed by executive management to have money spent to support e-mail and communications," explained Clair Althouse, VLSI's director of information systems and services.

A local-area network that does not fit smoothly into either LAN scenario operates at the Denver regional office of Amoco Production Co. While some terminals are linked to the company's VAXs and IBM mainframe, the chief purpose of the network is to provide communications among these systems and engineering workstations.

Amoco uses Decnet to connect its VAXs and Microvaxes, and it is evaluating the use of Decnet DOS on IBM PCs. It also has Interlink Computer Sciences, Inc.'s IBMVM/Decnet Gateway, which allows bidirectional communications between the firm's IBM 3090 mainframe and the computers hooked to Decnet.

"We have several specialized DECs," explained Ken Robinette, Amoco's supervisor of systems development. "We have one VAX running an [Intergraph Corp.] graphics system and another doing geophysical software and dynamic graphics. We also have a series of Microvaxes running a video image scanner system."

These computers generate large graphics that are then sent to the mainframe, which sends the graphics to be plotted on a Versatec, Inc. plotter. "This saves us the expense of providing specialized plotting for each VAX," he noted.

Though the applications of their local-area networks vary, the users interviewed are almost unilaterally optimistic about the effectiveness, ease of use and support they have gotten with their LANs. When asked how effective their networks are, three out of four users said, "Very." They cited high speed and reliability as their networks' best features.

"We hardly have any downtime," GSA's Weaver reported, echoing the others' comments. "The reliability of the networks is 85% to 90%." He attributed this record to the fact that the networks were debugged before GSA received them.

Despite his high rating for the networks' reliability, Weaver stated that the GSA's overall LAN scheme is about 60% to 65% of where he wants it to be. "The reason we're not all the way there is the micro-to-mainframe link. The key is mainframe applications, which have not been user-friendly because they are cumbersome and large," he explained. "Only recently has mainframe software become reliable for micros to connect to."

By contrast, factors that Amoco's Robinette lists for his network's performance are the high speed and ease of use of the mainframe communications. Interlink's IBMVM/Decnet Gateway transmits data from the IBM 3090 to a DEC computer at the same rate it transmits data within the IBM machine, he said. "Typically, an IBM-to-DEC transmission has to go through an IBM 3705 communications controller at a rate of [56K bit/sec.] With Interlink's gateway, the rate is 500K bits. That's about a tenfold increase."

The LAN at Amoco is also easy to use, Robinette said. Decnet and IBMVM/Decnet make the transfer of data pretty transparent, be reported. "As far as file transfer goes on Decnet, there's nothing to teach. It's just like calling any file except that you precede it with the node name." Interlink's gateway, he added, is identical to Decnet.

The only hitch when Amoco installed IBMVM/Decnet, Robinette said, was having it hook into Amoco's proprietary security system for VM on the DEC computers. "But it only took Interlink one week to get our security requirements installed."

The other users agreed that their LANs are virtually transparent and that accessing the network takes few keystrokes. "Yon just have to know the name of the node," Althouse said of VLSI's LAN. "After that, the user doesn't see the network unless it isn't working properly." In fact, he claimed, "The user just sees that the terminal is down, but it may be the host or the network."

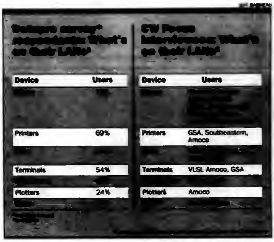
'Has very user-friendly commands'

To improve its LAN user interface, the GSA put a menu shell on top of its network. "Our network has very user-friendly commands," Weaver said. "They're brief and do a lot so that a user doesn't need to know computers to access the network."

Managers don't have a lot of time for training, he explained. "The network has to be as easy to use as possible because the executive's needs require immediate access." The average training time for users is one hour, Weaver reported.

Notably lacking in much of the users' evaluations of LANs is the issue of money. Though the users emphasized features over cost, analysts agree that networking prices have to come down before LANs become widely accepted. They suggest that users who purchase LANs today have a communications requirement that makes expenses a secondary consideration.

In a study from Delran, N.J.-based Datapro Research Corp. (see chart this page), 51% of 300 users surveyed said function and features were the factors that most influenced their decisions to purchase a LAN. .



Device	Users
[illegible]	[illegible]
Printers	69%
Terminals	54%
Plotters	24%

Device	Users
[illegible]	[illegible]
Printers	GSA, Southeastern, Amoco
Terminals	VLSI, Amoco, GSA
Plotters	Amoco

One concern of users is anticipating an office's future requirements. While the four users interviewed are generally pleased with their networking schemes, GSA and VLSI said they would do some things differently. In the case of GSA, its wiring plans would be altered. "When we grew, we had to rewire once or twice. Had we thought ahead, we could have rewired with the future in mind," Weaver said.

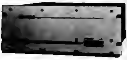
VLSI's Althouse said that given another chance, he probably would have done a serious evaluation of broadband channels vs. fiber optics.

Both Weaver and Althouse also discussed future enhancements to their LANs. Weaver is looking at two technologies. "I'd like to see voice-recognition networking, though I know it's a long time away," he said. "One thing GSA is looking at is face-to-face videoconference networking, but it's not cost-effective yet." Althouse said that VLSI will be making some conversions over the next few years. "We'll be getting microprocessor communications boards that fit right into our HP and DEC machines."

Althouse, who said that there will be a long-term educational process in designing and using LANs, also noted three industrywide improvements he wishes to see.

First, to provide end users with functional LANs, he said, MIS has to look at the system's function and applications, not just the nuts and bolts. Similarly, he asserted that vendors have to design their networks to serve a particular need. Developing a LAN and hoping someone will find a use for it is not the way to do it, he emphasized. Finally, he said, there should be a standard interface that allows a company to connect all of its networks and systems. But, he acknowledged, "No one has solved that one yet." ■

Hurst is a Computerworld Focus *senior writer.*



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CIRCLE READER SERVICE NUMBER 15

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CHARTING THEIR COURSES

With the cry for connectivity reaching a fevered pitch, two Goliaths, AT&T and IBM, have set forth their solutions. Which one will win the telecom spoils?

BY J. SCOTT HAUGDAHL

What do AT&T's Premises Distribution System (PDS) and Integrated Services Network (ISN) offer users that IBM's Cabling System and the Token-Ring Network do not? The answer to this question is crucial to MIS managers making critical communications choices.

AT&T has a more systems-oriented view of cabling systems than IBM. AT&T said it believes that a distribution system is composed of the cables, adapters and other supporting equipment that connects telephones, data terminals and other communications devices. This system is also a method of arranging these products within a building or on a campus in a logical and economical way.

PDS is a multifunctional distribution system that supports voice, data, graphics and video communications on premises. It uses fiber-optic and twisted-pair media and is suitable for a single-building, multitenant high rise or campus environment. PDS supports all of AT&T's products as well as other vendors' products. (For example, by using adapters and the AT&T Premises Lightwave System, PDS supports IBM 3270 terminals.)

PDS consists of six distribution subsystems and a grouping of equipment: campus, backbone (riser), horizontal wiring, work location wiring, equipment wiring and administration. It is based on an AT&T model that allows a distribution system to be divided into subsystems that can be individually analyzed and designed based on user needs, communications system requirements and building topology. This approach also facilitates logical and economical distribution system upgrades. The IBM Cabling System is similar in concept, but its overall view does not seem to be as well developed.

In mid-1984, AT&T introduced a data communications product designed for use as a local network for business, commercial, government, educational and medical facilities. It can also be used as a wideband, wide-area premises network, covering a university campus, a city or even nationwide facilities.

Whereas IBM has developed an extensive wiring concept, ISN generally relies on in-place premise wiring and allows for extension of the copper circuits with fiber-optic trunking systems. Thus, while IBM has to design wiring systems, ISN can run on existing circuits. ISN wiring has been designed to use the same piece parts as AT&T System 25, 75 or 85 wiring structures.

AT&T designed ISN to provide several important advantages:

- The ability to operate at high data rates and traffic loads, independent of geographic distribution.
- A simple media access method to support widely varying traffic types.
- Hierarchical organization using nodes and concentrators connected by high-speed trunks.
- A simple wiring scheme.
- Highly modular construction.
- Security by controlling physical access with the central bus structure.
- A flexible access algorithm that can provide for IEEE 802.3 compatibility modes (both AT&T 3BNet/Ethernet and Starlan connections are supported).
- Improvements in maintenance and administration (an administrative console can be attached to ISN for controlling connections and performing maintenance and diagnostics).

The Bell Laboratories-developed Datakit Virtual Circuit Switch network was the forerunner of ISN. ISN's architecture is substantially different from the IBM Token-Ring's. ISN consists of nodes and concentrators hierarchically connected by trunks. A node consists of three buses (contention, transmit and receive) built into a cabinet backplane. Data enters the switch via a concentrator and is switched on the node's short centralized bus structure in a packet-switched mode (at approximately twice the speed of IBM's 4M bit/sec. Token-Ring).

The result is that while the wiring types and structures of AT&T and IBM may be similar, the IBM access control technique (token passing) is distributed, while AT&T's is more centralized (short bus).

A major issue that arises is centralized control and management of the user interface vs. a totally decentralized approach.

With personal computers in widespread use, many users have become accustomed to access to decentralized computing resources. Many PC LANs are managed as such, yet many companies have strict policies regarding PCs and typically do not allow PC LANs to be installed (although there may be some type of connection to a host). The issue of ISN vs. Token-Ring may depend on how a company is organized and managed.

AT&T's Starlan

AT&T does, however, have a distributed type of LAN for personal computers and low-end 3B computers. Starlan, a 1M bit/sec. carrier-sense multiple access with collision detection Ethernet-like local-area network, is AT&T's strategic work group LAN. It is interesting that Starlan was designed to use separate transmit and receive twisted pair, the same requirement as the Token-Ring. Via connections to ISN, hierarchical systems can be formed much like IBM's bridges for its Token-Ring. The software for Starlan is an interesting hybrid of applications and systems software from 3Com Corp., Locus Computing Corp. and AT&T.

Although Starlan is a late entry into the PC LAN market, it received a boost when AT&T's efforts paid off to make Starlan an IEEE 802.3 standard. Companies such as Intel Corp., Chips & Technologies and Western Digital have developed Starlan-compatible chips, and many vendors such as and Xerox Corp. are already offering boards and hubs. With a little user persuasion leading to volume shipments, Starlan could become the departmental group LAN with the lowest cost per connection. Currently, the proprietary Omninet (Corvus Systems, Inc. never made it an open system — a costly mistake) is least expensive priced at at $199 for the adapter. Other vendors may claim to be less expensive but they don't fit the IEEE definition of a LAN.

The IBM Cabling System, introduced in spring 1984, is the underlying wiring system for the Token-Ring. Key components of the system are twisted-pair wire, wiring concentrators (multistation access unit), repeaters, connectors, patch panels and face plates. Unlike PDS, the Cabling System was designed to handle data only (except for non-real-time video and limited voice applications).

IBM designed the wiring system to be a structured system for all communicating devices from IBM, eliminating the previous ad-hoc approach and, the company said, eliminating many of the rewiring hassles. It is IBM's intent to make the cabling decision independent of the communications devices decision.

The cable can be used for more than just token-ring devices; for example, it can also be used point to point to support connection of terminals to hosts.

The physical topology created by wiring for the Token-Ring resembles interconnected stars, where all devices share the same dual twisted-pair bus, and if followed from device to device, forms a ring that eventually wraps back upon itself.

Type 3 wire

A late addition to the Cabling System was support for telephone-type wire. Presumably, this Type 3 cable addition is cost-competitive with AT&T's PDS but sacrifices LAN size (approximately one-third the total network size of using Type 1 wire) and number of devices (72 as opposed to 255 for Type 1) it can support. IBM's support of Type 3 wire may not have been just to counter the lower cost AT&T PDS. It appears that many of IBM's customers already had miles of unused Type 3 wire in place.

The token-ring Type 3 wire support was designed to be ad hoc and temporary, providing a migration path to the data-grade wire that will be required to support 16M bit/sec. If the customer does not have Type 3 wire installed, IBM is discouraging its installation in favor of Types 1, 2, 5, 9 and so on. In fact, there will be two categories of token rings — Type 3 token rings and Cabling System token rings.

An interesting aspect of the Cabling System was the introduction of a new data connector (the same as referenced in the

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CIRCLE READER SERVICE NUMBER 22

VENDOR STRATEGIES

802.5 Token-Ring standard). This connector terminates all twisted-pair wire, from the wall plate to the wiring racks. Two data connectors can mate by a 180-degree rotation of one connector. Unfortunately, this data connector costs about 20 times more to manufacture than the RJ-style modular jacks used in PDS.

The IBM 8228 Multistation Access Unit (MAU) is a wiring concentrator that connects up to eight stations to the ring via drop cables called lobes. The design and operation of the MAU is what gives the network's physical topology its "star-wired ring" name. A ring-in jack on the left-hand side of the device and a ring-out jack on the right-hand side of the device provide for a daisy-chain connection to other MAUs. The MAU provides for insertion/bypass of lobe segments and associated attaching devices. In addition, it facilitates write fault detection by an attached device, such as the IBM PC Token-Ring Adapter. As with PDS, a manager can more easily control user connections at the MAU.

The IBM Token-Ring, a 4M bit/sec. local-area network that operates with twisted-pair wiring, was the result of years of research and prototyping. The principal research was conducted by scientists at IBM's laboratory in Zurich. They developed the concept, the architecture, a prototype (the infamous Zurich Ring) and did the initial performance modeling. The token-passing protocol was chosen for several reasons, including guaranteed (deterministic) response times, better support of synchronous devices and to provide a way of implementing prioritized access to the token.

The Zurich work was continued by engineers and programmers at Research Triangle Park in North Carolina, where the commercially available products were developed. It was determined that 4M bit/sec. was more than adequate for office applications.

Research Triangle Park was responsible for the software and hardware necessary to implement the first commercial Token-Ring products: the IBM PC Adapter and the Media Access Unit. The PC Adapter and Media Access Unit, in conjunction with the previously announced and available IBM Cabling System, made up a complete local-area network for IBM PCs. The chip set developed for the PC Adapter board by IBM in Burlington, Vt., is the foundation for subsequent IBM-announced Token-Ring products.

IBM breaks with tradition

Historically, IBM remained aloof from IEEE standards, preferring to create its own proprietary product standards. IBM broke with tradition by becoming involved in shaping the IEEE 802.5 standard for the token-ring access method. Creation of 802.5 makes the Token-Ring system open (at least at the media access control level) for use with non-IBM products.

With the initial introduction of the Token-Ring in October 1985, IBM announced several products to operate with the ring. Included were the Media Access Unit; the IBM PC Adapter and software, including a Netbios emulator; 3270 Emulation Program; the Asynchronous Communications Server; and Advanced Program-to-Program Communications/PC. Subsequent announcements have included the PC Adapter II (with more memory and commands), PC Local Area Network Program Version 1.1., System/36 attachment via the PC/AT, bridges (based on PCs), copper and fiber repeaters and host attachments via the 3174 and 3725.

> **"**
>
> *Overall, the cost of components for AT&T technology is less than that of comparable IBM components.*

Thus, IBM's Token-Ring phasing strategy is to introduce products based on volumes of installed machines. The company announced in April, May and June 1986 support for System/36 and System/36 hosts. Unfortunately, MIS managers will have to wait until the second quarter of next year before the products become available.

In the meantime, end users of PCs are becoming attached to (no pun intended) the Token-Ring. There are still ways to get off the ring (via PCs) into host environments. The 3270 Emulation Program looks like a cluster controller (both local and remote configurations are supported) with PCs on the Token-Ring emulating 3278/3279 terminals, and the Asynchronous Communications Server — in conjunction with special versions of products like Microstuf, Inc.'s Crosstalk and Software Publishing Corp.'s PFS:Access — can get into asynchronous environments.

Overall, the cost of components for AT&T technology is less than that of comparable IBM components. For example, in addition to the high cost of the IBM data connector as mentioned above, the cost of baluns from AT&T is about 75% of the cost of baluns from IBM. Furthermore, the parts used by AT&T seem to be available in higher volume quantities. The average cost of ISN is around $400 per connection while the Token-Ring (with the standard PC Adapter) is around $900 per connection.

Earlier this year, IBM withdrew from

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the cable installation business, leaving the job to third-party vendors and wholly owned Rolm Corp. (IBM continues to provide wiring specifications to ensure compatibility with IBM equipment.) This move underscores the competitiveness of wiring buildings as well as the fact that AT&T is more of a Level 1 company with respect to the seven-layer International Standards Organization's Open Systems Interconnect model, whereas IBM is more of a Level 7.

IBM has stated the Token-Ring LAN will have a 20- to 30-year life cycle. Toward that end, IBM will continue to announce new products, enhance performance and protect existing customer bases. IBM's strategy of introducing Token-Ring products in accordance to target market size is sound. It will allow IBM to install hundreds of Token-Ring networks in office environments, giving the firm a strong foothold in the LAN marketplace, something the PC Network and PC Cluster failed to do.

System/36 support on ring

As the announced host attachments become available, the System/36 will be supported on the ring as well as the larger hosts. Support of larger hosts will start with either the channel-attached 3725 or 3174 cluster controller with one or more installed Token-Ring interface controllers.

A lot of questions have been raised regarding compatibility with IBM's Token-Ring, especially by users that are concerned about vendors using the Texas Instruments, Inc. token-ring chip set. Few realize that IBM is using TI's chip set in the adapter card for its RT PC.

It seems strange that IBM did not mention the use of the TI chip set in a press release to underscore the compatibility issue. The problem for developers is that there are no interfaces yet available to use this RT Token-Ring adapter. Why did IBM go outside for this adapter? Token-Ring development resources within IBM are booked solid.

As for compatibility with AT&T PDS, it is a little-known fact that the wiring between three IBM facilities in Raleigh, N.C., to support the Token-Ring was installed by AT&T using 62-micron fiber. The official IBM specification calls for 100-micron fiber, but the new IBM Token-Ring Network Optical Fiber Cable Options documentation describes how to use other fiber and what the limitations are. Perhaps this is a first step toward ISN/Token-Ring integration.

IBM's plans down the road include greater granularity in host attachment; bandwidth of 16M bit/sec. for graphics, file transfer, backbone rings and processor-to-processor (distributed) applications; additional network management (a single point of control for interconnected rings) including performance, configuration, operations and authorization management; and gateways to X.25, Integrated Services Digital Network and to non-IBM LANs and remote LANs.

AT&T will continue to integrate its systems, as one can see in the emergence of the AT&T PC, 3B series, ISN and private branch exchange technologies. AT&T has the lead over IBM in the area of LAN-PBX integration. The company may introduce a token-ring bridge for ISN. Even so, the lack of interconnectivity between AT&T ISN products and the many IBM Token-Ring products leaves a tremendous window of opportunity for third-party vendors.

AT&T has chosen a proprietary (short-bus) LAN to connect nonproprietary devices and other LANs. IBM has chosen to implement an open LAN to connect proprietary devices. Neither offers the end user totally open, nonproprietary approaches to local-area networking.

AT&T wants to become the world's integrator of nonhomogeneous computer systems while IBM becomes the world's integrator of IBM computers, leaving the remainder to third-party vendors and systems integrators.

Where does this leave the end user? For heavy PC-based applications, stick to established vendors like Nestar Systems, Inc., Novell, Inc. and 3Com. For more complex applications, call your nearest systems integrator. ■

Haugdahl is a senior systems specialist at Architecture Technology Corp., a Minneapolis-based consulting, publications and seminar firm specializing in data communications.

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CIRCLE READER SERVICE NUMBER 4

Avoiding Network Tie-ups

GEOFF O'CONNELL

BY CHARLES G. TEETS

Fine-tuned network management, as a combination of technical and people skills, can keep small and large LANs or wide-area networks operating smoothly.

Imagine driving in Manhattan with no lights or police to direct traffic. At 4:00 a.m. on a Monday you would have few problems because there would be very little traffic. However, it is a different story at 8:00 a.m. There would be chaos and confusion, with commuters waiting for the streets to clear. That is what a network is like when there is no network manager and no network management software.

Network management has been around for a long time, but many of us have not been aware of it. A prime example is telephone companies which have small to very large telecommunications networks that they have to manage efficiently (and transparantly to users) or incur our wrath.

There are three major types of networks that need managing. Small local-area networks (LAN) connect microcomputers to share resources and require the least network management. Larger LANs connect mainframes, minicomputers and microcomputers and require more network management. Wide-area networks provide remote and local communications facilities between a variety of computers and require the most network management. The complex levels of network management in these areas can range from simple controls implemented by network protocols to sophisticated and complex network management software on microcomputers and minicomputers.

The network manager must be a flexible person who can go from a meeting with the president of a company to hands-on work on a technical problem. A successful network manager must be able to deal with all levels of people in an organization. A technical person who has problems with communication skills would not do well in this position.

Network management personnel monitor network performance, maintain the network, interact with users, train users and deal with issues of new technology. However, there are specific tasks associated with managing different types of networks.

The person who manages a small LAN has to deal with access to data, security, printer sharing, user applications and activity and error logs.

Access to data usually involves configuring the network to restrict certain disk drives to certain users while allowing users to share other disk drives. A deeper level of access involves the way users can share or be locked out of directories on a shared file server disk. If there are users who run common applications, you may need to implement file and record locking to prevent two users from updating the same information or to prevent one user from updating information that another one is using. Waiting to implement such functions after the network is installed will significantly increase your work load.

Security varies in importance from one location to another, depending on the sensitivity of data. Levels of security in small LANs include access to data as well as logon and password security. An additional level of security can be added to prevent users from wandering from one machine to another. This is done by tying a hardwired code in the microcomputer to the individual's logon and password. In this way you can be assured that users will only be able to access their own machines and other users will not be able to use someone else's logon and password.

After common disk storage, printers are the most shared devices on small LANs. As with multiuser systems, the users on the LAN will need help in utilizing, understanding and locating these printers. When micro users have a printer connected to a personal computer, they have little difficulty remembering how to use it, but the choice of several printers usually necessitates a configuration chart showing which printers are connected to the LAN and where they are located.

A network manager must be aware of users' needs — when they want to implement a new application on the network or attach a micro or peripheral device. Being well versed in a network's software and hardware helps users with what they are trying to do, with understanding what their job requires and with recognizing other programs and devices that might help fill their needs.

Some network management and control software creates activity and error logs on disk. These logs can be used by the manager of the network to look for patterns to determine who may be abusing his rights on the LAN, find instances of attempts to breach security, check performance, find inefficiencies and detect problems before LAN performance is seriously affected.

A network manager who deals with larger LANs must consider all of the aspects of small LANs plus several others. Because this type of LAN can accommodate a variety of systems, terminals and peripheral devices, you may want to consider delegating responsibility to a few of your people.

Additional areas of concern for larger LANs include maintaining a data base of access rights and the network configuration, monitoring performance, controlling data transfers among different systems, helping users with their application problems and performing accounting and billing.

Maintaining some type of information structure to show the network configuration becomes increasingly important as the network grows. Data bases are a convenient way of maintaining this information; most network management and control software for large LANs include this capability. This data base can come in handy should building maintenance personnel tell you to reroute some of your network cabling because your cable routing violates local fire and building codes. You will also appreciate this network management feature when the office manager tells you that users will be switching offices — again.

Performance monitoring also becomes increasingly important as the network grows. The are tools to help find network bottlenecks and help detect problems quickly before they create disasters. Users sometimes complain about slow response; performance monitoring can ease this complaint. Performance monitoring can detect configurations that may soon be inadequate for your network and areas that are overdesigned.

Unlike the small LANs that use mostly compatible systems, larger LANs frequently have incompatible machines that need the ability to transfer information. This is one of the basic purposes of a LAN, but it is not always an easy task to accomplish.

Many LANs in this category allow the interconnection of minicomputers and microcomputers that run under different operating systems and use different file formats. Incompatibility problems may arise as more computer vendors jump on the token-ring bandwagon. When IBM mainframes are thrown into the mix, problems between mainframes and minis may become evident. This scenario taxes the abilities of the LANs to provide interconnection. Make sure you can handle conversions on your network.

Users on larger LANs need a network manager for a unique reason — they develop homegrown software solutions. Programs may be written by people who do not understand the structure and restrictions of a network. Managers should be well versed in what users need and what they are capable of doing to provide the utmost support.

User training is key to managing your network.

In large companies the ability to keep accounting records and to bill back services based on network use becomes important. As different departments come on-line you may want to spread network management costs among departments. This can be a way to justify your department to someone who never needs your services and who questions the need for network management, but it can also help provide a vital internal accounting function for your company.

The wide-area net challenge

Wide-area networks pose different challenges for a net manager. Not only must you be concerned with the same items that small and large LANs require, you must also deal with remote users, hackers and, sometimes, the telephone company. The following are some additional concerns for a manager of wide-area networks:

■ Traffic engineering. Traffic engineering is one of the first steps involved in setting up a wide-area network. There is network analysis software on the market that can help you plan the most effective routing for your needs while it takes into account contingency plans in case

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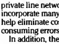

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Steve delivered his message in Computerworld as well as in other trade publications. He quickly discovered that Computerworld does; indeed, get results. *"Computerworld has helped CIS reach its target audience — the decision-making systems managers who are current and future users of VAX systems,"* he says. *"Basically, Computerworld readers are serious buyers; if they inquire about a product, they're a viable lead — and often a sale."*

Steve is sure about this because CIS tracks its leads with an in-house marketing system.

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of serious failures. This software can help you determine the least cost routings, best uses of concentrators and switches, most cost-effective transmission methods and alternate routing for emergencies.

■ Multiple protocols. One of the toughest aspects of control in wide-area networks is the wide variety of protocols. Each vendor has its own remote data communications protocol; the network manager will be faced with many of them. Careful use of protocol converters, switches and concentrators can enhance protocol handling capabilities while keeping the network and users under control and costs down.

■ Call management. Concerns in this area can range from choosing the most cost-effective routing to stopping a person from accessing sensitive data. Many private branch exchange products now provide these capabilities, but the manager must decide on the best PBX and control how it is used. This PBX is only part of your wide-area network and must be integrated into the rest of the network.

■ Line performance. Line performance is closely associated with call management because when a degraded line is detected that line's traffic must be switched to another line. This aspect of managing the network can also help in determining potential failures.

■ Spares. When problems are detected on the network, good network management software and hardware will allow you to bring in spare circuits, reconfigure parts of the network and reroute traffic. All of these give you the ability to take out the defective parts quickly and dynamically with minimal impact on your users.

A network manager may also have to control hybrid networks that allow both local and wide-area networking. These are usually sophisticated enough products that they provide many of the tools needed to control and manage them effectively.

Education is a tool that network managers can use to their advantage. For example, the Oregon Institute of Technology in Klamath Falls is now offering a program for undergraduate degrees in network management. A degree in office automation technologies from this program can prepare a graduate for the technical end of network management. This person would be responsible for network performance monitoring, maintenance and security. Specializing in information systems may lead to a manager's role as liaison between different network users.

Both of these programs can help people develop skills in either the technical or management areas of network management.

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> *Users on larger LANs need a network manager for a unique reason — they develop homegrown software.*

Artificial intelligence, with sophisticated graphics, is another tool that can help network managers. This AI/graphics combination can aid in laying out the network, testing it for validity and simulating its operation. LAN routing is another good application for graphics and AI software. When you have to lay out wide-area networks that use several different routing schemes, this software is a great aid in determining the best layout.

As AI applications become more sophisticated they will have the ability to take most of the management burden off an individual. Many of the monitoring and control functions that people perform require logical decision making that can be easily accomplished by AI programs. These applications will also have the ability to access other programs on other systems in the network and the ability to run many of the diagnostic and reconfiguration tools available to the network manager. ■

Teets is a data communications consultant with TCT Consulting in Mt. Laurel, N.J.

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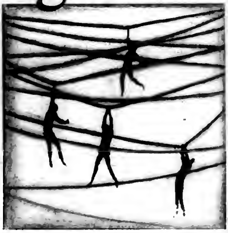
SPECIAL SECTION: SYSTEMS INTEGRATION

Holding Out For Systems Integration



DAVE RIDLEY

·BY·KIM·MYHRE·

The concept of "systems integration" has come to replace what was referred to in the 1970s as the "office of the future" as a primary user objective, a key vendor strategy and the most prevalent mystery of our time.

Most of the mystery is a result of an inaccurate definition. In general terms, systems integration can be characterized by the development of multivendor, multifunction and often customized distributed information systems involving hardware, software and communications.

The key element in this definition is the "custom" aspect of systems integration. Both user organizations and suppliers say they believe, perhaps correctly, that their own requirements for integrated systems are special and specific. However, this idea is in conflict with how most manufacturers of information processing systems view product design and development. These vendors tend to develop products that are general purpose enough to have broad market appeal while proprietary enough to protect customer loyalty. User organizations have had to make compromises in matching available technology with specific requirements.

Users have been both the beneficiaries and victims of vendor strategies. While the general-purpose design of most information systems allows some flexibility in terms of affordable systems enhancements and selected integration support, user organizations find themselves constrained by the inability and unwillingness of vendors to give up the push for proprietary solutions.

Consider the question of whether system manufacturers will ever be willing to be "true" systems integrators. Vendors cannot easily ignore their vested interest in selling more of their own systems. Furthermore, because of the the product-specialist way in which manufacturers have defined their markets, very few vendors have the ability to provide the specific systems integration capabilities that many customers demand.

This fundamental gap between user and vendor in the area of systems integration has confused the issue. This confusion centers on the level of integration support a vendor can provide to meet the customized requirements of multivendor shops and also to satisfy the vendor's competitive interests. Users will be required to make compromises between their integration objectives and vendors' competitive interests. However, to keep customers and maintain any competitive interest at all, it may be the vendor's turn to compromise, particularly in the area of standards conformance and multivendor connectivity and compatibility.

The need for systems integration has become apparent to both users and their systems suppliers. Most MIS shops have a variety of equipment from different vendors running incompatible applications and operating systems. The floors and ceilings are packed with cabling, the applications backlog is growing, and budgets are coming under scrutiny. Clearly, the lack of a resource consolidation is a significant bottleneck that is hindering productivity gains and, even more importantly, is not cost-efficient.

MIS has taken up the challenge. It must find ways to maximize systems investments by consolidating existing resources and building a framework to support strategic acquisition and implementation of new systems. There has been a movement in user firms to put in place a strategy that supports and nurtures systems integration.

This user trend toward integrated systems has already had an impact on vendor profitability, an impact reflected in the overall industry downturn. MIS movement toward more centralized control of acquisitions, coupled with the establishment of corporatewide criteria for connectivity and compatibility has lengthed sales cycles and placed the burden of integration support on the vendor. Add to this the love affair users are having with standards (many of which are not reflected in available technology), and you have a very difficult environment

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> *Vendors, out of economic necessity, will embark on a strategy of selective and controlled systems integration support during the next five to 10 years.*

in which vendor's must compete.

Vendors, out of economic necessity, will embark on a strategy of selective and controlled systems integration support during the next five to 10 years. However, translating a vendor's commitment to systems integration into customer solutions will be the real challenge.

Differences will exist in the ways in which vendors will approach emerging opportunities for systems integration; however, there are some common denominators.

First, there is a trend in vendor strategies toward seeking business solutions rather than just toward selling products. This idea is like the dentist who treats the "whole person," not just that patient's teeth. Of course, the dentist charges a fee for fixing teeth, but there is value added by the concern with the patient's mental health, diet, posture and life-style. The theory is that the patient will come back if he feels the dentist has concern for him as a person.

In much the same way, a vendor can attempt to maintain account control and status as the primary supplier by being concerned with the "whole organization," even though the ultimate goal is to sell wares.

For this strategy to result in the good health of the whole organization, vendors will need to provide solutions beyond their primary product area.

A second common vendor strategy is the trend toward alliances, joint ventures and acquisitions. Vendors have been filling in the pieces of their product lines and bringing in capabilities that their primary products do not have.

IBM has been aggressively acquiring the products and capabilities it needs to be in the systems integration business, due mainly to its resources and influence. Beyond its Rolm Corp. and MCI Communications Corp. acquisitions, IBM has developed partnerships with a number of service companies, established controlling relationships with value-added resellers and third-party software developers, is involved in numerous vertical industry projects and contract systems integration projects and is incorporating products into its lines.

IBM's competitors have been attempting to follow suit, particularly in the area of networking. Nearly every computer manufacturer, for example, has been activitely incorporating communications equipment, hiring communications expertise and, in many cases, signing joint venture agreements and/or acquiring communications companies.

This trend has been, in many ways, the cornerstone of vendors' systems integration strategies. Not only is network capability an extremely important and fundamental integration component, but owning the network architecture has become a critical competitive formula. Vendors are placing much more emphasis on network-centered solutions than on the traditional computer-centered approach to information systems development.

Supporting the network architecture in terms of connectivity and compatibility will increasingly replace owning the mainframe architecture as the key to influencing a customer's buying decisions. It is this movement toward standards-based network integration that will present the most important challenges to all but largest, most diversified vendors.

Network standards support growing

Vendors across the board have been giving in to support for network standards. They are beginning to de-emphasize much of their proprietary approach to gain customer loyalty and are attempting to distinguish themselves and their integration capabilities along more vertical, application-specific lines.

This trend has been most clearly illustrated by processing service companies. McDonnell Douglas Automation Co., for example, has reorganized to serve major vertical markets, while General Electric Information Services Co. is supplementing a customer's network with specific application support like automated check clearing, electronic data interchange and electronic mail.

Equipment companies have also been reevaluating their general-purpose approach to product design and marketing. They are assessing their areas of strength, providing compatibility with standards and choosing their piece of the market carefully.

The broad nature of systems integration will have many information systems vendors scrambling to distinguish themselves, emphasizing niche strategies that reflect the diversity of user requirements. Maybe this is as it should have been all along. ■

Myhre is vice-president of the Communications Research Group at International Data Corp., a market research firm based in Framingham, Mass.

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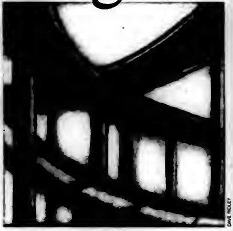
CIRCLE READER SERVICE NUMBER 6

SPECIAL SECTION: SYSTEMS INTEGRATION

Paving The Way To Connection



DAVE RIDLEY

·BY·RUDOLF·STROBL·

The issue of data communications has been largely resolved during the past 10 years. Vendors are conforming to a seven-layer architecture embodied in the International Standards Organization's Open Systems Interconnect (OSI) reference model.

Meanwhile, the model has been enhanced by IBM, Digital Equipment Corp., Honeywell, Inc. and other vendors that have begun implementing OSI communications protocols and standards into their computers. Model extensions have been made to standardize interconnection to different systems such as local-area networks (LAN) and even carrier-based systems like Integrated Services Digital Networks (ISDN).

OSI Layers 1 through 5 have been tested in the marketplace and a number of LAN, X.25 and board-level products support their validity. Together, these five layers encompass information transport. They are purely communications transfer oriented. Since these layers are responsible for the interconnection of computers, networked computers need to support them.

However, the commerical success of OSI is predicated on the maturing of the upper layers. Apparently, when the OSI model was put together, Layers 6 and 7 were not given full attention. Upper layers provide services for the establishment of connections between terminals and programs as well as between programs.

Today, there exists a black hole of sorts between applications and the communications network architecture. Applications cannot communicate with one another unless there is uniformity across the upper layers, that is, identical application program interfaces for every type of network. This lack of uniformity poses a burden for software developers since they cannot develop code that will operate atop different transport networks. Ideally, it should not matter whether the underlying data communications protocol is IBM Binary Synchronous Communications or Systems Network Architecture (SNA), Transmission Control Protocol/Internet Protocol, X.25 or others.

In the past 12 months, the standards process regarding Layers 6 and 7 has gained considerable momentum. Layer 6, the presentation layer, has been accepted as a Draft International Standard (DIS). When protocol specifications reach this phase, the technical protocol content is frozen and manufacturers are safe to start implementations. A number of protocols in Level 7 (the applications level), dealing with the movement of data, messages, documents and job streams, have reached the DIS phase.

Protocols regarding distributed applications, publishing, voice, graphics and imagery have yet to reach this stage. Moreover, to make the movement of data, messages, documents and so on commercially viable, the following standards issues must be resolved:

- Directory management. Directories are the next big push in standards organizations. Standards development here is currently in the draft proposal stage.
- Program-to-program communications. This area is for distributed applications. A technical committee of the European Computer Manufacturers Association (ECMA) earlier this year proposed adopting IBM's LU 6.2 as ECMA's standard for the OSI connection-oriented transaction protocol. LU 6.2 is based on an architecture that permits peer-level control between distributed applications. However, the proposal faced fierce opposition from leading IBM competitors that claimed that by adopting LU 6.2, it would become an international standard, which would give IBM an unfair advantage in the marketplace. ECMA voted to abandon the work started and is still in search of such a protocol.
- Network management. This item is considered by many standards process participants as too implementation specific. Major issues are unresolved to date. There is considerable dissent as to whether a single layer (no lower than the session layer) should be dedicated to management functions.

- Standardization relative to user interfaces is rudimentary at best.

The maturing of OSI Layers 6 and 7 and discussions around some other major issues such as directory and network management demonstrate the commitment of vendors to these standards. But it will take several years before these standards are commercially viable.

Meanwhile, most computer vendors support both OSI and IBM's SNA. Many U.S. computer vendors consider LU 6.2 to be a key interface in bridging applications with the two architectures and are actively developing its support. By the end of this decade, implementations of SNA and OSI will have come to dominate the marketplace. Users will most likely run both on their computers or at least interface into one or the other. The question remains, however: With SNA as an apparent marketing success and LU 6.2 rapidly becoming another de facto standard, why has IBM also committed to OSI and implemented it?

To answer this question, one needs to understand IBM's three major goals: maintain profit margins, maintain profit margins and maintain profit margins. By definition, IBM is neither a technology company nor a marketing company. IBM is the ultimate portfolio manager. Driven by this orientation, IBM can exhibit a holding pattern that provides opportunities for other vendors to validate the market.

Accordingly, IBM uses technology as an economic lever, thereby controlling users, key markets and taking advantage of opportunities. However, once other vendors actually validate the market and business opportunities, IBM recognizes these opportunities as big bets. Past examples include the office systems and engineering/scientific marketplace.

OSI was part of IBM's holding pattern. Even though IBM has offered products in the past that implement OSI protocols and services (for example, Synchronous Data Link Control is a subset of OSI's High-Level Data Link Control; X.25 is implemented in at least eight IBM products), only now is OSI becoming a big bet for IBM — particularly driven by the European market and government procurement pressure.

IBM has recognized that there are significant business opportunities in multiple-vendor sites. Most of IBM's larger computers are used by customers that have a variety of supplier's architectures (Digital Equipment Corp.'s Deenet; Honeywell, Inc.'s Distributed Systems Architecture; Siemens AG of North America, Inc.'s Office Architecture; Burroughs Corp.'s Network Architecture and so on).

> *IBM does not care whether is sells OSI or SNA as long as that network helps sell IBM computers and applications.*

Some of IBM's competitors have developed facilities so that their products interwork with SNA-based products. Some have not. This represents a limitation on the range of applications that could be developed by users or software publishers.

To the extent that OSI permits intercommunications between otherwise noncommunicating systems, it will help IBM sell more applications with attendant software and mainframe requirements. In IBM's words, the name of the game is openness, meaning that users can connect more and more devices (and applications, as Layers 6 and 7 mature) so IBM, even by connecting foreign devices and applications, can still remain the vendor that helps the user control his network.

IBM does not care whether it sells OSI or SNA as long as that network helps sell IBM computers and applications. For this reason, the most powerful validation of OSI is forthcoming from IBM, which is expected to be among the first vendors with a full-fledged, seven-layer OSI implementation.

In addition, bringing various architectures together will drive the need for backbone network nodes. Users will run both SNA and OSI on their backbone network nodes. Non-IBM vendors can be expected to connect their computers via OSI to IBM backbone nodes. The marketplace for backbone network nodes will therefore grow tremendously and represents another big bet for IBM.

The extent to which other manufacturers build compatible equipment and look-alikes will not hurt IBM's business; rather, this activity will open new markets for IBM. So interconnectivity — via OSI — makes IBM look good without cost to IBM.

However, OSI interoperability problems could prove costly to non-IBM vendors. Most vendors that provide OSI-compatible offerings bundle functions of several layers into a package. These packages will interoperate only with similar packages in a network unless users write customized communications software for the OSI-compatible net. There could be considerable incompatibilities between installed packages and new, unbundled OSI products.

Part of this problem rests with the nature of the OSI reference model. By definition, the model is concerned only with interconnection of systems and not with the internal functioning of each open system. The model provides interoperability between nodes that conform to the specifications but not modular building blocks within a node. However, users contend that the bundled OSI offerings from one vendor should interoperate with unbundled offerings from other vendors; that is, users would like to have the ability to mix and match

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layers from multiple vendors within a network node so they can choose the OSI offerings with better price/performance.

Some disagreement

Standards process participants disagree whether specifying interfaces for each of the layers will constrain implementations. Others contend that well-defined interlayer specifications are important for product development.

Some vendors prefer to acquire communications subsystems from outside suppliers rather than developing them in-house. With well-established interlayer specifications, the task of implementing subsystems could be made easier. This is particularly important for vendors that are carving out market positions as software integrators rather than as software builders.

Third-party software developers stand to benefit as well. Interlayer protocol specifications will enable them to concentrate on writing applications for any network rather than having to be concerned with the network interface.

But accessing bundled OSI packages at any layer requires vendors to open and publish proprietary implementations. Two driving forces that could accelerate a solution to this problem are the Corporation for Open Systems (COS), which was founded earlier this year, and pressure from users. COS, a user/vendor forum to discuss issues surrounding standards, is certainly a step into the right direction, helping minimize time and expense for OSI implementors.

GM drives OSI push

As for users, the automotive industry is the strongest proponent of OSI to date. This push is largely a result of the General Motors Corp.-initiated Manufacturing Automation Protocol (MAP), which makes use of existing OSI protocols. MAP is more than a series of protocols for integrating diverse computers and communications environments; it is a major component of GM's strategic program to produce inexpensive cars worldwide.

GM's public statements that it will not procure equipment from manufacturers that do not comply with MAP underscores the sway users such as the company are having in the standards arena. GM's policy has been adopted by other large industrial users.

Currently, five dozen companies in discrete or process manufacturing have MAP-based plants under construction. As a result, vendors are rushing MAP-conforming products to the marketplace. Noncompliance could essentially result in loss of market share.

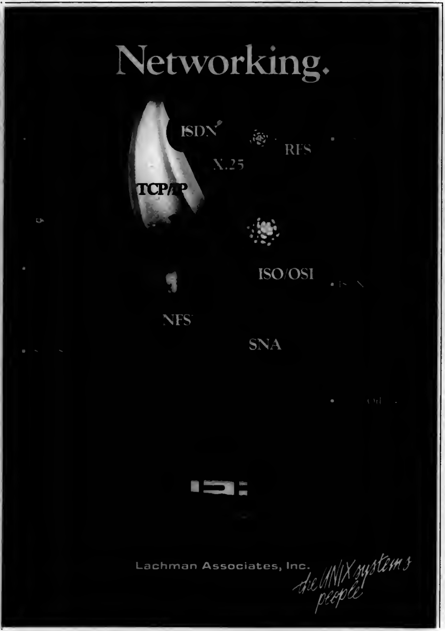
MAP is to industrial users what other OSI protocols are to service and transaction-oriented industries and businesses. However, banks, airlines and other financial institutions have not taken the interest nor leadership that GM has in promoting standards for commercial use. Until OSI becomes a user-driven requirement like MAP, other implementations of OSI will rely on vendors.

Except for IBM and, to a lesser degree, DEC, most vendors, in spite of their commitment to the standard, still push proprietary solutions. Perhaps the reason behind this move is that to date few vendors are gaining revenue from OSI. The OSI market needs a portable version of the protocol so that users can pick up the program, pay a license fee and run OSI.

However, the lack of agreement on interoperability between different OSI implementations remains a major barrier to the commercialization of OSI. Unless vendors concur, users will find themselves limited to using a range of equipment with correspondingly limited function and application capability.

While the impetus of vendors like DEC has gotten OSI to where it is today, IBM appears to be the one vendor that has recognized interconnectivity as a big bet. With the lack of functional implementations of OSI, IBM will most certainly reap the commercial benefits of the standard.

Strobl, Ph.D., is a senior consultant in Arthur D. Little, Inc.'s Information System Section where he specializes in the strategic issues confronting information industry vendors and users.



SPECIAL SECTION:
SYSTEMS INTEGRATION

Selecting A Network Standard

DAVE RIDLEY

·BY·REBECCA·HURST·

Data processing managers once worried about what mainframe model would best serve the needs of their company. Today they wonder how they will connect a mass of personal computers to the mainframe and link micros on a peer basis. A universal networking standard, such as the International Standards Organization's (ISO) Open Systems Interconnect (OSI), is a promising solution. However, DP managers who expect to have a fully developed commercial product in their hands today may see their plans go up in smoke.

Terminal emulation works when offices have a half dozen mainframes and thousands of dumb terminals. However, office workers today are as likely to have PCs on their desks as they are to have terminals.

Using terminal emulation on a PC and going through the mainframe to talk to departmental systems is a poor way to use resources, according to David Terrie, president of Scituate, Mass.-based Newport Consulting, Inc. Not only does this approach load down the host, but mainframe communications protocols are not designed for high speed.

Generally, PC users require few resources from the mainframe. Eighty-five percent of the information they need is located in the department, explained George Colony of Forrester Research, Inc. of Cambridge, Mass. Only 10% resides in the mainframe, and another 5% comes from outside sources.

The ideal solution for many organizations is a network that supports peer-to-peer communications among all of its computers. However, users and MIS managers are sometimes skeptical. Users fear they will lose their power and independence if they connect to the mainframe, and DP managers don't want to get involved in a messy, undefined environment, Colony said.

For most DP managers, the networking standards choices are IBM's Systems Network Architecture (SNA), the OSI model and Digital Equipment Corp.'s Digital Network Architecture (DNA). (See chart page 40.) However, none of these provides the combined level of definition, openness and support required by the corporate environment.

SNA is a well-defined networking architecture that works in the office today, and it is receiving strong support as a result of IBM's huge installed customer base, particularly in the U.S. IBM, though, will continue to optimize its proprietary networking software for its own computers, analysts predict.

OSI is an open system with international support, but its protocols may not be fully refined for another five years. Until then, DP managers cannot count on OSI alone to provide seamless communications among a variety of machines.

DNA is reported to be a more mature architecture than SNA, but the DNA architecture is not more open. Moreover, DEC does not have the market resources and installed base IBM does to rally the same kind of support for its product. This limits the number of different systems that can connect to DNA without additional protocols from SNA and OSI.

The OSI model is the culmination of the networking standards jointly adopted by the ISO and the Consultative Committee on International Telephony and Telegraphy (CCITT). It divides a network architecture into seven independent layers. Within each layer, the model defines hardware-independent protocol standards that can be changed without affecting the other layers. Two such protocols are CCITT's X.25 at the network level and X.400 at the transport level of OSI.

OSI has been lauded as the architecture that will become a universal standard, allowing various vendors' computers and intelligent devices to communicate at all levels. However, OSI's proponents may have a difficult time making it live up to this promise. IBM has the advantage in the installed user base and in the refinement of SNA.

Of the major U.S. companies, 90% to 95% have IBM and IBM-compatible equipment, according to Lee Doyle, an analyst at International Data Corp., a Framingham, Mass.-based market research company. He said he believes that many of these users will adopt SNA during the next two to three years and noted that even the U.S. Army, patron of universal standards, has adopted SNA.

A variation of OSI, the Manufacturing Automation Protocol (MAP), has gotten a big push in the manufacturing arena because of General Motors Corp.'s support. Following GM's adoption of MAP, many of the major hardware vendors announced that their products would support the protocol. When 20 of these vendors demonstrated MAP together on their systems, though, there were glitches in the products, Doyle said.

These glitches reflect the basic problem with a universal, committee-developed standard such as OSI: It is not a fleshed-out architecture. And it is not as richly defined as SNA. "It's very difficult to design a complex, seven-layer networking model that is hardware independent," Doyle explained.

"The fastest way to bring down a corporation is to adopt OSI. It's not a smart business solution," he said.

The lack of definition can lead to confusion and incompatibility among users. One point of confusion Doyle sees is the X.400 protocol standard. Vendors' products are incompatible because X.400 is open to interpretation. "There is a lot of finger pointing, and everyone thinks his version is right," he said. This happens much less with IBM, he explained, because either a product is compatible with SNA, or it's not.

X.400 is expected to become more defined in the future, however. "It's in the prototype stage," Doyle noted, and he compared it to the early stages of X.25, the standard of which has become refined. OSI will become important in the 1990s, Doyle said, as its definition matures. During the next two to three years, though, he said he expects users to adopt IBM's SNA and its attendant protocol standards.

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> *There is a basic problem with a universal, committee-developed standard such as OSI: It is not a fleshed-out architecture. And it is not as richly defined as SNA. 'The fastest way to bring down a corporation is to adopt OSI. It's not a smart business solution.'*
>
> **— Lee Doyle**
> **International Data Corp.**

SNA closely follows the OSI model, said John Dexheimer, an associate at Broadview Associates, Inc., a consulting company based in Fort Lee, N.J. The model, he explained, is an outline, and the SNA protocols are specific implementations that are consistent but go beyond OSI.

SNA began as a hierarchical structure designed for centralized systems in which all devices reported to the host mainframe. With the growing number of personal and departmental computer users demanding to communicate with one another, IBM has introduced and begun implementing several architectual definitions that address peer-to-peer communications. IBM calls these definitions Advanced Program-to-Program Communications (APPC).

The APPC standard is based on two SNA facilities, PU 2.1 and LU 6.2. PU 2.1, which addresses the transport (physical) level of the OSI model, provides peer-to-peer communications between processors. LU 6.2 applies to the higher session and presentation levels of OSI. It handles program-to-program communications that view applications as peers.

Moreover, LU 6.2 was designed to handle applications on all computers, from micros to mainframes. Both PU 2.1 and LU 6.2 are supported on several systems including IBM's Series/1, System/36 and 38 departmental units.

IBM enhances APPC

In June, IBM announced an enhanced version of APPC called Application-to-Application Networking (APPN). APPN, also known as Low Entry Networking, ideally allows personal computers and workstations to communicate as peers without special hardware, IBM said.

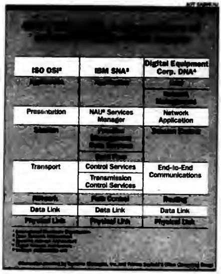
LU 6.2 supports several facilities at the applications level of SNA. The most important services used by IBM and other computer manufacturers are the SNA Distribution Services (SNADS), Distributed Office Support Systems (Dissos), Document Content Architecture (DCA) and Document Interchange Architecture (DIA).

SNADS is an implementation of the LU 6.2 protocol that provides delayed delivery services. Dissos, an application subsystem in the host, allows remote users to access services and documents on the host through DIA and DCA. DIA defines how documents are sent across a network, and DCA defines the form of the documents.

By allowing users to go directly to the processor containing the resources they need, the LU 6.2 facility in APPC and APPN can save a company both time and money. The host computers suffer less performance degradation because they are not being tied up by departmental communications.

LU 6.2 also runs communications more efficiently than mainframe terminal emulation software, Terrie said. With terminal emulation, each block of characters has to be sent in a separate session. With LU 6.2, once the session is set, it does not need to be reestablished. As a result, users can transmit more data faster.

LU 6.2 also opens up communications for IBM's competitors since its peer-to-peer capability can be implemented on non-IBM computers. Most office minicomputer vendors, including Data General Corp., Wang Laboratories, Inc. and DEC, will have announced the availability of IBM's LU 6.2 along with their other SNA gateway products by the end of this year, analysts agree. IBM's overwhelming presence in U.S. corporate environments effectively pushes its communications links down the throats of these vendors, but the peer-to-peer nature of LU 6.2 makes the pill more palatable.



ISO OSI[2]	IBM SNA[3]	Digital Equipment Corp. DNA[4]
[illegible]	[illegible]	[illegible] [illegible]
Presentation	NAU[5] Services Manager	Network Application
[illegible]	[illegible] [illegible]	[illegible]
Transport	Control Services Transmission Control Services	End-to-End Communications
[illegible]	[illegible]	[illegible]
Data Link	Data Link	Data Link
[illegible]	[illegible]	[illegible]

In fact, some analysts suggest that IBM is handing its competitors a marketing strategy on a silver platter. They point to IBM's relative weakness in the area of office minicomputer systems and the ability of strong competitors such as DEC and DG to provide transparent communications with IBM's mainframes and personal computers.

However, Broadview's Dexheimer said certain factors can tip the scale in IBM's favor. "To some extent, LU 6.2 opens up communications at the departmental level to DG, DEC and Wang," he acknowledged, "but IBM's own midrange products are substantially enhanced by APPC." Dexheimer also noted that any network control software IBM designs will be optimized for IBM's systems.

A second area of debate is SNA's role as a de facto standard. LU6.2 was proposed as a standard for OSI but was rejected earlier this year by the European Computer Manufacturers Association. Europe traditionally has been less tied to IBM, but Terrie said he believes that the decision will affect the U.S. as well. "This loosens IBM's grip on the network environment," he said, "and it will allow vendors to offer alternative protocols."

Many vendors will continue to support their proprietary networking facilities and IBM's SNA, Terrie said, but they will adopt OSI standard protocols as they become more defined.

The vendor that is having the most impact with this strategy is DEC. In fact, DEC is considered ahead of IBM in networking for departmental office automation. "In the networking race, IBM and DEC will end up as a close first and second, respectively," Terrie said, "but right now, DEC is winning."

Colony agreed, saying that "IBM is playing catch-up to DEC. Decnet has been a true peer-to-peer network for four years."

Decnet, SNA and OSI form the three branches of DEC's networking strategy.

Decnet primarily consists of the proprietary architecture — DNA — on top of the two leading physical networking schemes: Ethernet (IEEE standard 802.3) and token ring (IEEE 802.S). Decnet can also run several SNA facilities including an LU 6.2-based Disoss interface supported by IBM's DIA and DCA protocols. DEC offers these SNA facilities because all vendors must incorporate IBM's SNA and Dissos in order to have a common ground for communications, Terrie explained in a report for Patricia Seybold's Office Group.

Although DNA is a rich set of protocols, DEC will announce a full seven-layer set of OSI protocols. The OSI and DNA architectures will be run side by side, Terrie predicted, but eventually OSI will become Decnet. DEC does not have the marketing strength to make its proprietary networking architecture an industry standard, he explained.

DEC may emerge as leader in OSI

DEC is in a strong position to become the leading commercial proponent of OSI. The company has a large installed base of customers in both the departmental office and scientific environments. It is also one of the few companies with the resources to support both its proprietary and OSI protocols simultaneously, Terrie observed. In addition, migrating to OSI should be easy for DEC because DNA is very similar to the OSI model.

Politically, DEC's support of OSI protocols is a good move because it appeals to the Europeans who are more resistant to standards that come out of IBM. "It's a matter of perception," IDC's Doyle said. "DEC primarily sells Decnet, but because the company is putting research dollars into X.400, it's winning sales internationally."

Despite DEC's strategy, most analysts agree that it will play second chair to IBM's first. Most also agree that in the near term, SNA will have an edge over OSI.

"What's standard or not will evolve over time," Dexheimer stated. "The pendulum is swinging such that IBM will set the real standards of the marketplace, whether or not the standards committee accepts them." ■

Hurst is a Computerworld Focus *senior writer.*

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CHOOSING YOUR TELECOM CARRIER

• BY • LOU • VERCHOT •

The postdivestiture communications field offers many exciting options for selecting the telecom service with the right cost/benefit ratios for you. Arming yourself with timely, accurate information can be the best way to help you make that decision.

Although divestiture promised exciting opportunities and unprecedented choices in telecommunications services, MIS is now coping with the reality.

A variety of services are being offered by a large number of vendors. The services include local-exchange calling and long haul for intrastate and interstate transmission. Alternatives run the gamut from analog and digital to microwave, fiber optic, coaxial and cellular. Potential vendors include a local-exchange carrier, a reseller, your landlord, a national long-distance carrier, a regional long-distance carrier, the adjoining state's local carrier (for those in corridors), a Fortune 500 firm or an equipment supplier.

Of course, you can still call your local telephone company and let it do everything. Or you can leave it to chance and let some other vendor make your decisions. But if you do, you may end up with unsatisfactory service, the wrong service or a service that you pay for but can't fully use. You may even get the service you requested, but it may not be the one you really need.

There have always been choices — but never as many as there are now.

It's important to understand the applications you need and what each one costs. You may need to acquire equipment. That may entail leasing or making a capital expenditure. There are also legal and logistical problems you need to know about even if you decide to let your local telephone company handle these arrangements.

The following are four issues that an MIS manager needs to address:

- Understanding your organization's needs.
- Selecting the right suppliers.
- Getting involved with implementation.
- Considering doing it yourself.

Telecommunications is often a major support service for the way a company conducts business. Therefore, it is important to solicit information from a variety of sources to get an accurate perspective of the applications you need.

Using a global perspective, managers are responsible for identifying the necessary elements and ranking them in order of importance. Ranking permits both the technicians and the financial decision makers to determine the necessary trade-offs to achieve an efficient yet economical selection.

Using functional definitions has proved to be the best method for this phase because you disregard the physical and environmental limitations and identify needs, recognizing that the resources may be inside or outside the organization.

Functional definitions allow you to formulate the application in terms of purpose, practicality and utility. The functional elements are as follows:

- Primary use.
- Quality of service.
- Number of repetitions per unit of time.
- Input and output, including type of information, frequency, size or length and transmission mode.
- Operational conversion issues, such as training.
- The anticipated life of the application.
- Constraints, including time, operational, legal, physical and financial.
- Future growth capabilities.

TELECOM PLANNING

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The definition stage is an iterative process because all of the alternatives — even the simplest or least costly — are not always obvious. Thorough discussion often leads to a reordering of priorities and a general reduction in the number of functional elements.

> *There have always been telecom service choices — but never as many as there are now.*

Today, carriers are seeking to tailor communications to particular application categories. That means users must now understand how the services fit each application if they are to use the services efficiently.

If you begin with a clear understanding of what you want to accomplish, the requirements can be specified in a number of ways. Moving beyond the functional definitions, you can determine which elements are performed by a particular communications technology and its related services.

The next step is to match a standard or specialized service offering with the functional requirements. This process also involves iteration, because bringing the application to the operational phase generally involves a number of trade-offs. Each trade-off may affect previous decisions, which in turn could require a modification to the operational constraints.

To set criteria for each element of an application, consider the following:

■ Response time — amount of time to get the information to the user.

■ Throughput — number of transactions or operations performed per unit of time and designation of normal and peak times.

■ Busy rate — effect that blocking, caused by other transactions or traffic, has on the application.

■ Maintenance — effort required to keep the network or application operating.

■ Service — ability to repair the network when something is not working properly.

■ Implementation — ease of learning the process and actual use.

■ Flexibility — ability to incorporate enhancements and future growth.

■ Robustness — sensitivity of design to variations, which reduce quality.

■ Heartiness — ability of the network to withstand stress and shocks and have sufficient redundancy to remain operational.

■ Cost — need to determine total manpower, equipment and services to make the application economically worthwhile.

When it's time to select a carrier, other considerations depend on the services you need. For example, local telecommunications service is offered in three pricing formats: flat, message and measured. Although flat-rated service is the apparent choice in terms of economics, it generally has a small calling area; therefore, one of the timed alternatives may be a better selection. Another consideration is that not all service rating variations are available in each state.

Long-distance service is available from six major carriers in the U.S. and a number of resellers. The six major carriers are AT&T, Allnet Communications Services, Inc.; MCI Communications Corp., U.S. Sprint, ITT and Western Union Corp. Options include regular and discounted long-distance services, WATS and WATS replacements and high-volume WATS/WATS-replacement discount services.

Research vendor services carefully

To assess the differences between vendors that offer similar services, it is necessary to research each offering, including price, and determine how each matches your particular operational and financial needs.

To determine if there are qualitative differences between vendors, ask for references and check them. Currently, there is no single, independent source for qualitative measurement of services; however, some information suppliers do conduct user surveys to assess quality. In addition, question people you know who are using a particular service. They are more likely to make candid comments that point out strengths and weaknesses.

The benefits of a particular service depend on your needs. For example, you can use analog lines to transmit data. However, if high quality is essential, you will probably need a digital-based service with synchronized circuits.

You can obtain a high-quality hub-based service such as AT&T Dataphone Digital Service (DDS). But if you are not located in a hub city and you want a pure-data service for intrastate or intra-Local Access and Transport Area applications, your options may include service from local-exchange carriers. The quality of these services is not as high as those in DDS hubs, but they may be acceptable for your needs.

The key to assessing any service is understanding the specific requirements and the limits on how those requirements can be adjusted. If a specific requirement, such as digital services between two buildings, cannot be met by standard services, then custom services (for example, short-distance microwave) might be

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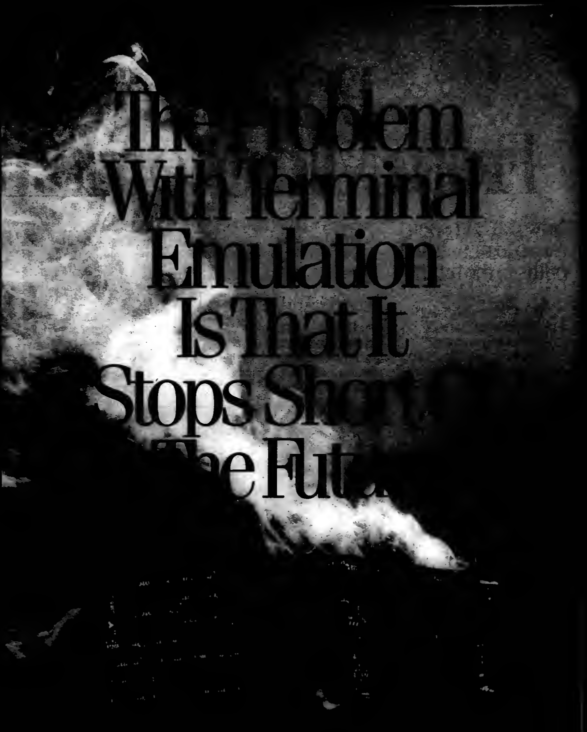
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required. These custom services may require capital expenditures, long-term lease contracts or similar long-term commitments before they can be supplied.

Pricing policies among vendors is another issue to consider. Premium service providers, such as AT&T, MCI and U.S. Sprint, stress quality or other features rather than price. Some offer 24-hour hot lines for customer service.

Other vendors compete primarily on price. These vendors promise quality or equivalency of service, but they stress price more than any other fact. The price difference could be related to a difference in quality or other factors such as efficiency.

There are vendors that offer superior price/benefit ratios as a method of entering a particular market. It appears that firms such as MCI and U.S. Sprint will attempt to use this strategy to gain market share during the near term. As a result, AT&T, MCI and U.S. Sprint may provide even higher value offerings by enriching their services and/or dropping their prices.

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> *Some telecom services stress prices. However, low prices can mean lower quality or efficiency.*

As a result of divestiture, another area that needs to be addressed is the status of premises equipment and wiring, because the local telephone company does not necessarily own them any longer. You may even be asked to purchase the equipment and wiring that a carrier installs.

In some states, the party responsible for telecommunications on the premises is the landlord, real estate developer, reseller or the principal tenant. If one of these supplier organizations is involved, the flexibility of your network designer may be restricted if your request for a specialized telecommunications service is denied.

Sometimes the issue of ownership is unclear with regard to telephone distribution wire, risers, wiring frames, cables and wiring closets. Before you can add, remove or alter your service, your must establish and agree upon property rights.

Establishing ownership also becomes important if damage occurs while changes in service are being made or new equipment is being installed. The people involved may be unable to rectify the situation, even if they are qualified to do so, because the owner is responsible for deciding how the situation is to be corrected and who is liable.

In addition, equipment installation may require permits or authorization that go beyond permission from the landlord or local telephone company.

For example, use of microwave in urban areas must be negotiated among current users, and authorization for frequency allocation comes from the Federal Communications Commission. There are also potential liabilities from radiation if antennae are improperly focused or installed.

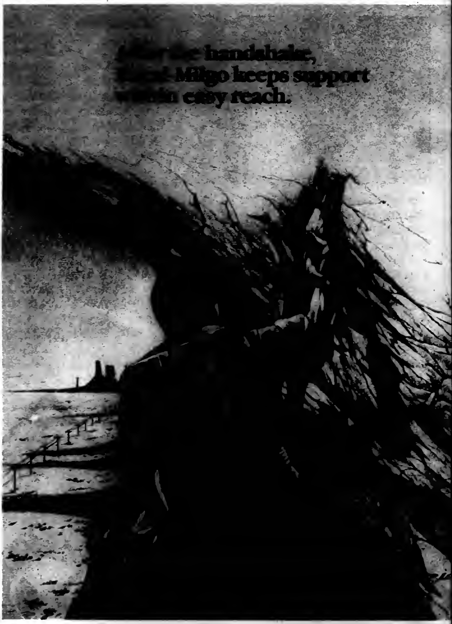
Responsibility for telecommunications service must also be defined. Carrier-supplied service typically includes servicing, maintenance and restoration capabilities. However, the point at which the carrier's responsibility ends (the network interface) may be located inside or outside your building.

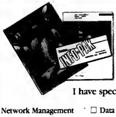
What service is available

Beyond the premises, you also need to know what service is available. Use of a particular service may depend upon local availability and whether local suppliers will offer these services to you at a reasonable cost.

With ownership for various parts of the telephone network potentially belonging to different entities, the logistics of making changes and repairs as well as maintaining and restoring service can be complex. These complexities cannot be ignored, because they can affect the telecom service you are trying to provide.

Once again, you have





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choices. You can hire a maintenance service or pay a firm to manage your network. Or, you can do it yourself.

Consider doing it yourself

Managing a network or a telecommunications service yourself is complex — but you can do it if you understand what is involved and what the options are.

Basically you need to know how the different services work, the major elements used in rating each service, the application that fits the service and how the costs vary. To make sound decisions, you will need current, accurate information about the available technology, services and pricing, equipment and communications standards.

- Technology — This information should include fundamental concepts for various services, basic operation, components and applications for which each technology is best suited and the benefits and limitations vis-a-vis other technologies.
- Services/pricing — This information is available from each of the specific carriers or resellers in your area. Regulated carriers must publish their own tariffs, listing their services and rates.

Information clearinghouses compile all of this information and make it available in various media, from basic reproduction to on-line services.

- Equipment — Information about capabilities, pricing and applications is available from equipment manufacturers, distributors and wholesalers that market the devices.
- Communications standards — Standards are established for equipment and services.

Equipment vendors sometimes establish the standards for physical and electrical parameters. The Consultative Committee on International Telephony and Telegraphy and the American Standards Association deal with parameters for services, particularly with regard to protocols or formats for services.

Once again, you have choices. If you decide to use a subcontractor, close liaison and direct involvement in defining the applications are important. You can also hire a consultant for special assistance in implementing a particular application.

If you plan to select a local or regional reseller rather than a major carrier for long-distance service, you will need to be aware of restrictions, because resellers typically have limited services. The services may be limited to a particular time of the day.

Or, perhaps only voice transmission is permitted or the transmission speed is restricted to 2,400 bit/sec.

In choosing a reseller, you will also want to know how your service will be backed up if a problem occurs at off-peak times, such as weekends. If there are too many restrictions for your application, it may be wiser to select a major carrier and pay the potentially higher costs in order to have peace of mind.

Doing it yourself also requires a commitment and a decision regarding the degree to which you will become involved.

Timely information key

The key to making the right choices for telecommunications services is having timely, accurate information. It is no longer possible to rely on individual vendors — whether it's a long-distance carrier, a local-exchange carrier or an equipment vendor — for information on the latest technology, pricing or service.

With more independence among suppliers, new and more efficient services are being introduced on a regular basis and older services are being enriched with new features. With competition increasing among suppliers, prices are changing at a more rapid pace than ever before.

The result is better cost/benefit ratios.

Be aware of the impact of your choices. The efficiency and economics of your applications depend on decisions you make. Appreciate the importance of getting involved. Don't leave everything to chance. ■

Verchot is the senior editor of "Impact," a CCMI/McGraw-Hill monthly newsletter that provides competitive cost analysis of telecommunications services. He has more than 26 years of experience in the telecommunications industry.

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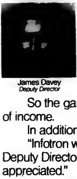

James Davey
Deputy Director

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CIRCLE READER SERVICE NUMBER 24

ANTHONY SCHULTZ

New Directions In Bypass

• BY • STAN • KOLODZIEJ •

A healthy child of deregulation, bypass technology came to life following the breakup of AT&T and has thrived as corporations became concerned that the divested Bell operating companies could not provide flexible data and voice network services.

While the concern for adequate services and support is still a big factor behind corporations adopting microwave, fiber-optic, satellite and other forms of bypass technology, cost-cutting is emerging as a more important topic fueling the bypass industry.

"Companies are definitely looking to bypass as a way of amortizing communications costs over the long run," explained Jim Herman, director of the telecommunications consulting group at BBN Communications Corp., Cambridge, Mass. "They are looking at communications like a stock portfolio, not placing all their trust or communications into a one-carrier basket."

Not that bypass technology is necessarily less expensive than existing common carrier facilities. For example, though costs have come down in the past two years, fiber-optic networks are still more expensive than coaxial and twisted-pair links in their initial cost outlays, but in certain cases, the payback can be very short.

Bill Phile, manager of corporate networks at Hercules, Inc., a chemical concern, said the company has just installed a three-node fiber-optic cable network linking corporate headquarters with its research and development and marketing departments in New Castle, Del. The fiber network has been fully operational since April 1986, and Phile said that by 1987 the company is expecting to save $800,000 a year over existing cable telephone company links.

"We had lots of data and voice requirements between the three locations, and the local phone links were just too costly," Phile explained. "The speed and capacity of fiber to handle both data and voice are great. The network can handle the equivalent of 28 T1s, though we only need 12 T1 capacity at this point. It also allowed us to eliminate one satellite earth station in Wilmington, [Del.]"

Phile said Hercules looked into microwave transmission but "had problems with the line of sight, and we would have had to do a bounce shot. It just didn't work."

There is a twist to the situation at Hercules. The company could have gone to one of several independent fiber-optic companies, but instead it contracted with its local telephone company, Delaware-based Diamond State Telephone, which is part of Bell Atlantic Corp.

"Diamond State told us it didn't want to lose our business," Phile said. "It came in with a good financing arrangement, its people knew fiber, and the service and response have been outstanding. There have been no problems with the network. I think they're unique that way for a telephone company."

Diamond State also has E. I. du Pont de Nemours & Co. interested. The Seaford, Del., conglomerate will soon have the telephone company install fiber at its head office. "They're an aggressive bunch; they wanted our business," explained Ralph Stevenson, telecommunications manager at du Pont.

Diamond State is hardly unique, however. The threat of losing business to bypass companies has many divested carriers scrambling to provide bypass facilities around their local loops directly to long-distance lines. Illinois Bell in Chicago, for example, is setting up microwave facilities for less expensive, higher speed data and voice transmission for its largest customers. New York Telephone Co. and Southern New England Telephone Co. are offering fiber-optic links for customers, as does Pacific Bell for San Francisco corporate customers.

BBN's Herman said that there are several reasons involved in a company's decision to install bypass facilities, and cost savings is not always the dominant one.

"It depends on the demographics, whether the number of users and communications load justifies bypass. It depends on the amount of data concentration in the company, on the [local-access] tariff structures of the given area," according to Herman. "I know of companies that have installed bypass on nontechnical grounds, strictly as a leverage against the common carriers, to get better service."

Certainly there are some built-in limitations with certain bypass technologies. Microwave is tricky in large urban areas, needing a clean line of sight between links, and transmission quality can suffer from such weather factors as fog and snow.

The First National Bank of Boston, however, found conditions right for microwave. Three years ago the bank put in a microwave link between its head office in Boston and its data center located three miles away in Dorchester, Mass., basically to handle terminal-to-mainframe communications.

"Our tie lines with the telephone company were terrible," explained John Doggett, director of

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> *Fiber-optic usage is expensive but on the rise. Of 400 user sites surveyed, 20.5% are now using fiber-optic networks for voice and data, and another 30% said they will use it in the near future.*

telecommunications at the company, "and we never got a clear answer as to why. On top of that, the economics were prohibitive and the data delivered by the telephone company was poor."

Doggett said that First National Bank of Boston is using cable as another bypass link from the head office to U.S. Sprint (a joint venture between GTE Corp. and United Telecommunications, Inc.) long-distance services. The bank is also looking into providing another microwave link to another data center in Newton, Mass.

Microwave, however, may not always be the short-haul bypass solution for the bank, said Doggett, who finds the use of microwave rather limiting, citing the high concentration of buildings, the problems with the notorious Boston weather and the generally high cost of microwave maintenance. Doggett added that his preference is really for copper cable. Microwave and fiber, being active systems, require high concentrations of power and maintenance and necessitate generators and emergency systems at the bank's head office.

'It's a trade-off'

"Yet it's a trade-off," Doggett said. "Copper becomes expensive over distance, and there's something very appealing in being able to control your environment through bypass."

To Doggett, the economics of bypass technology are important, but the real need is for a clean digital link between the two switches.

"With the telephone company," Doggett explained, "we found that the more players they serviced, the more the quality seemed to go down, especially with the local loop. The attitude of the phone companies also can be frustrating. It almost seems like you're doing something illegal with bypass. I think telephone companies panic a bit about lost business, but really, in our case, only about 1% of our business is through bypass. The remaining 99% is still with the phone companies."

Despite its inbred problems, microwave is apparently still an important player in future bypass schemes for most Fortune 500 companies. The Market Information Center, Inc. (MIC), a Marlboro, Mass., research firm, found that the companies it surveyed regarding the importance of microwave in their future networking schemes placed the technology at a median of nearly three on a scale of one to five. This compared with a 2.3 median rating for satellites and a 3.3 median rating for fiber optics.

Satellite service can be unpredictable, expensive and only cost-effective for those few corporations that are truly geographically dispersed and carry a heavy load of data and voice communications among these locations.

However, advances in VSAT technology and the appearance of low-cost ground stations are bringing satellite communications prices down. (VSAT systems use a large central satellite dish that transmits and receives data to and from smaller dishes located at remote sites. The smaller dishes are usually less than two meters in diameter and cost from $10,000 to $20,000, with transmission speeds ranging from 9.6K bit/sec. to 56K bit/sec.)

"As prices continue to decline, retail companies are becoming big users of low-cost ground stations," explained Martha Goodwin, director of publishing at Telestrategies, Inc., a Maclean, Va., telecommunications research firm. "Retailers like K-Mart Corp., which have a large number of small outlets scattered throughout a large area, are jumping on the satellite bandwagon."

Ku-band eliminates interference

There is another plus with satellite bypass. One previous problem with satellite transmission, the interference of its C-band frequency with earthbound microwave frequencies, has been eliminated through Ku-band transmission, which spans 12 GHz to 14 GHz, a much higher frequency, eliminating interference.

One company, Southland Corp. of Dallas, will be using Ku-band satellite transmission to link 300 district offices

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within Southland's chain of 8,000 7-Eleven convenience stores. One of the big attractions of the system for Southland is the ability to add and change ground station nodes very quickly, instead of waiting months to have leased phone lines changed.

Companies such as AT&T, GTE Spacenet Corp. and Xerox Corp. are the main providers today of Ku-band satellite services.

The satellite field, however, isn't stopping there for diversity. Comsat Telesystems, Inc. of Fairfax, Va., has been successfully marketing its Transportable Communications System 9000, a portable satellite earth station that weighs 108 pounds and can transmit voice, telex and facsimile data full duplex at 9.6K bit/sec.

Adding spice to the satellite business is the recent announcement by the National Aeronautics and Space Administration that it has scheduled 1989 for the launch of a communications satellite that could provide a cost-competitive alternative to fiber-optic transmission. Termed the Advanced Communications Technology Satellite, the device will use high-powered, narrow-scanning beams in the Ka band (20 GHz to 30 GHz) to provide point-to-point communications.

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> *Microwave is important in the future bypass schemes of the Fortune 500. A research firm found that these companies placed it at a median of nearly three on a scale of one to five.*

Fiber-optic usage is expensive but apparently on the rise. Of 400 user sites recently surveyed by MIC, 20.5% are now using fiber-optic networks for voice and data communications, and another 30% said they will use it in the near future. Corporations in the MIC survey averaged about 1,000 employees and were classified by MIC as Fortune 500 companies.

MIC also found that the heaviest users of fiber optics will be in the manufacturing, transportation/utilities, business services, banking/insurance and government sectors. Significantly, the firm found that the seven regional holding companies were about evenly split in their current and planned use of fiber.

All the divested Bell operating companies said they aim to expand their fiber-optic services into the Integrated Services Digital Network, which will some day give users access to high-speed data communications channels with the same ease users now experience when they plug into conventional voice channels.

T1 provides 'worst performance'

The controversial T1 data bypass facilities local carriers offer have their share of critics and proponents on the user side. Using old war-horse twisted-pair wiring but operating at the fast data rate of 1.544M bit/sec., T1 was described by Doane Perry, senior telecommunications consultant at International Data Corp. (IDC), Framingham, Mass., as providing the "worst performance characteristics of any Digital Signal, Level 1 transmission type."

T1, however, is relatively inexpensive, because common carriers can defray user costs by using wiring and transmission equipment already in place. In the last few years, as more companies expanded their computing facilities and data communications needs, independent equipment vendors jumped into the market with new T1 multiplexers, improving T1 switching services.

T1 users include government bureaus and data service companies. Other companies are now seeing T1 as an important bypass link for combined voice and data networking strategies.

The John Hancock Mutual Life Insurance Co. of Boston, for example, is leasing T1 lines from the local phone company and using the lines to access AT&T's point of presence (the point where the long distance carriers' facilities connect with each of the 160 Local Access and Transport Areas across the U.S.). The company said that the T1 links will provide cost benefits above lower speed data transmission links but, more important, more flexibility in future data transmission needs.

Telestrategies projected that telephone company T1 circuit demand will grow at a compound annual rate of nearly 43% from an installed U.S. base of 10,500 circuits in 1985 to 62,360 circuits by the end of 1990. The firm also said that bypass T1 circuit demand will climb at an overall annual compound growth rate of 53% between 1986 and 1990. T1 is a hot market.

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CIRCLE READER SERVICE NUMBER 20

The divested Bell operating companies are doing more than just fighting for added bypass business in the marketplace, however.

Two current bills before the U.S. Congress, the Dole Bill and the Teuke-Swift Bill, could have an impact on the bypass industry if passed.

The Dole Bill is designed to relieve the divested carriers from the regulatory influence of the Federal Communications Commission. The divested Bell operating companies are classified as Class 1 Local Telephone Companies, "which implies permanent regulation of the [divested Bell operating companies] by the FCC, not a bright prospect, since the [divested carriers] are increasingly threatened by bypassers of the local exchange network and even by competition from AT&T, IBM and others," explained Alan Pearce, president of Information Age Economics, Inc., a Bethesda, Md., consulting firm.

"Advances in VSAT technology and low-cost ground stations are bringing satellite communications prices down.

Pearce explained that the Teuke-Swift Bill is designed to allow the phone companies to get into equipment manufacturing as well as all computer and telecommunications information services except that of electronic publishing, basically giving the divested Bell operating companies the go-ahead to provide bypass switching equipment and value-added services to bypass networks.

"If the bills pass," wrote Pearce in the "Telecom Insider," a newsletter published by IDC, the divested Bell operating companies "could still face an uphill battle at the FCC to get approval for policies designed to assist [the carriers] in competing freely in the burgeoning telecommunications information services and equipment marketplace. At this point, however, significant deregulation of the [divested Bell operating companies] by the FCC appears to be a remote prospect at best."

'Both bills have zero chance'

In private conversation, Pearce is more direct: "Both bills have zero chance of being passed. They are both going nowhere."

Will the carriers lose business to the bypass providers? The fact that AT&T is becoming more aggressive in the bypass field, and the possibility that IBM might be a big player sometime in the future are seen as dark portents by the divested Bell operating companies. There is also a psychological factor involved. Down the road, the inability to provide customers with alternative transmission services might erode customer confidence — and the bottom line of divested Bell operating company business.

Though there are communications users who still feel deregulation was a negative, bypass is no doubt being helped by the new conservative attitude that casts a jaundiced eye toward any legislation in general that seems to restrict customer freedom of choice.

"The airlines don't tell you what form of transportation to take to get to the airport," Doggett said. "It's the same with communications. People should be able to get to long-distance lines any way they want." ■

Kolodziej is a Computerworld Focus *senior writer.*

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CIRCLE READER SERVICE NUMBER 23

What Are Your Connectivity Choices?

• BY • STANLEY • GIBSON •

Will a telecommunications or MIS manager's choice in cabling provide a pathway to the future, or will it lead to a dead end?

Cabling decisions are virtually irreversible, and one choice can mean years of smooth sailing or years of headaches and expense. Installed in a building, cabling is usually too expensive to modify or remove and it cannot be sold or used in another department the way other computer equipment can.

Just as superhighways carry all kinds of traffic, from the tiniest economy cars to the largest trucks, so the perfect cabling system should carry all kinds of electronic transmissions. Ideally, there would be only one kind of cable and one kind of connector.

But until such a system arrives, users must be content with existing choices. Tomorrow's networking systems will be made not of one cable type but of a blend of twisted-pair wire, fiber-optic cable and broadband and baseband coaxial cable.

Of all cabling types, fiber optic and twisted pair are emerging as more important than their peers. IBM, AT&T and Digital Equipment Corp. have all configured standard systems that rely on them. Meanwhile, baseband coaxial Ethernet cable is firmly entrenched in many local-area network (LAN) installations, and broadband coaxial cable has a sure foothold on the factory floor.

Realizing that their equipment is used in a networking context, these three major vendors have sought to provide that context — the better to assure the acceptance of their equipment. Recently, Bell Atlantic Corp. joined the trio by offering a similar cabling system of its own, called the Universal Information Transport Plan. The regional holding company aims to have its configuration adopted by other divested Bell operating companies.

In 1984, IBM introduced its wiring scheme, called the IBM Cabling System. It is based on telephone twisted-pair wire, data-grade twisted pair and fiber-optic cable. Five cable types are included, each to handle different voice and data communications requirements. Although several cable types consist of a combination of data- and voice-grade twisted-pair wires, voice and data are always transmitted on separate pairs of wire.

The IBM Cabling System wall outlet has two connections, one for data and another for voice transmissions. The data connector allows workstations and host processors to attach to data-grade twisted-pair wire, and a telephone connector provides telephone support on three voice-grade twisted-pair wires. Formerly, IBM sold its Cabling System directly and through distributors, but it recently announced that it would sell the system through distributors only.

In May 1985 AT&T introduced its Premises Distribution System (PDS), a uniform cabling system that uses combinations of existing or new twisted-pair wire and optical fiber.

AT&T said PDS is intended for installations where the equipment of various vendors is used. PDS can accommodate from one to 4,200 pairs of twisted-pair wire and up to 144 optical fiber strands. The twisted-pair wire may be used for concurrent, but not simultaneous, data and voice communications. PDS is designed to incorporate Starlan, AT&T's low-cost twisted-pair local-area network introduced earlier this year.

DEC recently introduced Decconnect, which includes twisted pair and fiber-optic cable but also offers baseband coaxial standard Ethernet cable. Ethernet is used as a backbone from which either new thin-wire Ethernet or twisted pair will run to workstations and terminals.

A special wall outlet offers four network connections: for telephone, terminal, intelligent workstation or personal computer and video equipment. DEC designs, sells and supports all Decconnect installations.

All three wiring systems have proprietary wall outlets that may limit the choices for installing equipment on the system despite vendor claims of openness, said industry analyst Marty Gruhn, vice-president of Tempe, Ariz.-based Sierra Group. Gruhn takes the view that the three vendors are pursuing a marketing strategy that is geared primarily to boost sales of their equipment. "The guy who owns the wall outlet owns the terminal," she said, likening the rush to control wall outlets to the rush of the 19th century's railroad barons to lay track in new regions.

IBM's new bottom-up strategy

"IBM's strategy has subtly changed. It has changed to provide the cabling system first then to sell LANs to run on it. It's a bottom-up strategy," Gruhn said.

"It's part of account control," offered Lee Doyle, a networking analyst with International Data Corp. (IDC) of Framingham, Mass., seconding Gruhn's assessment. But Doyle said the major vendors have not had immediate success in getting large corporations into their wiring fold. "IBM and AT&T haven't convinced major corporations to rewire. People go piecemeal when they have an existing building." Where IBM has succeeded in selling its wiring plan, he added, the customer has already been totally committed to IBM.

Gruhn said selling cabling systems to realtors that are in the process of wiring an office building is a fundamental part of all three companies' marketing strategies. She added that a cabling decision can be as important to real estate considerations as it is to MIS. Because a well-wired building is more likely to find a buyer, it may pay to install wiring that a future user might need, even if the original occupant does not use it. It is always more difficult and expensive to retrofit a building than it is to outfit a building from the start, she said, and just to cover all contingencies, some builders are leaving additional duct space to accommodate future cabling runs.

"A realtor should run at least two sets of twisted pair because you're going to have a phone and some kind of terminal at every desk," Doyle said.

Despite the move to populate the cabling world with proprietary schemes, at least one user is fighting a counterstruggle for his own low-cost wiring plan.

Jerrold Patz, assistant director of the Bureau for Systems Policy and Planning for the state of Massachusetts, has developed a plan for uniform cabling consisting principally of twisted-pair wire and fiber-optic backbones. Patz, however, claims to save money by doing his own wiring layout and buying inexpensive off-the-shelf components.

"If you were told you could only use one kind of lamp in one room of your house, you would be outraged, yet that is how DP has been done for 10 years," he asserted. "Information must become like household electricity," Patz continued. "If you have an electric lamp, you want it to work in any plug."

The cabling standard he has created is a simple one. It consists of two six-wire twisted-pair wires going to every work space at 150-square-foot intervals. Two six-wire RJ11 (also known as RJ13) phone jacks handle all voice and data needs. His generic six-wire twisted pair is identical to IBM's Type 3 wire and will support IBM's Token-Ring Network, Patz claimed.

"We decided we could carry all our data on twisted pair," he said, adding that he has no need for coaxial cable except for certain islands where its higher speed is absolutely required. He said he has successfully connected Burroughs Corp., Wang Laboratories, Inc., IBM, ITT, Lee Data Corp., DEC, Sperry Corp. and Data General Corp. equipment to his network.

His low-cost twisted pairs take the place of many fancier cabling types. Instead of Wangnet's dual coaxial cable, Patz runs on one twisted pair at full speed. Patz said he is even able to run Ethernet over three twisted pairs, although he is not yet fully satisfied with the results. He also admits some difficulty in connecting Sperry computers, which are specified to require 10 twisted pairs. But Patz was able to run those too over fewer wires after finding that not all the wires Sperry called for were in fact carrying signals.

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> *'I'm not hostile to vendors, but they are intimidated when they see something done that they say can't be done.'*
>
> **— Jerrold Patz**
> **state of Massachusetts**
> **Bureau for Systems Policy**
> **and Planning**

"I'm not hostile to vendors, but they are intimidated when they see something done that they say can't be done," Patz said.

For Patz the need for uniform and simple system is dictated by the fact that 25% of his state's offices are reorganized each year, either moving within the same building or to other buildings.

"We want wires in the walls that will serve department X. But when department X moves, we don't want to have to rewire the building," he explained. "If you start pulling custom cable, you will be pulling it forever."

Industry standard figures for moving a terminal are $400 and two weeks. Patz can do it for $200 but said he considers that cost still to be too much. In departments under his control, that is a yearly bill of more than $1 million, he said.

While Patz's plan offers the openness and modularity that vendors offer, Patz

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said he delivers his result at much less cost. His six-wire RJ11 connectors cost 22 cents each, while some IBM connectors sell for $6 each. One type of IBM wiring costs $3.50 per foot, while Patz spends only 12 cents per foot for his twisted-pair wire.

Patz uses baluns where it is necessary to attach twisted pair to coaxial cable fittings. He said he obtains these baluns from a supplier at a much lower price than that offered by the major vendors.

His twisted pairs run from office spaces to wiring closets on each floor of a building. There they connect to the building's backbone, which may be either fiber-optic or coaxial cable.

Patz said his advocacy of "garden-variety technology," is "like proselytizing now." But he claims to be gaining converts in state agencies. "There are other revolutionaries out there."

And what is the motivation for Patz in saving money? He said that when given the job he was told he would have to save 10 times his salary to keep the position. He said he is doing that easily.

While not a do-it-yourselfer of the same stripe as Patz, Joe Gianino, manager of network technology for McDonnell Douglas Aerospace Information Services Co. in St. Louis also said he does not need an outside service to configure his networks and does not welcome new cabling types.

"We want to use telephone-type twisted pair wherever we can," Gianino said. His twisted pairs run from wiring closets to terminal servers. Gianino uses Ethernet to connect wiring closets and fiber-optic cable to connect buildings and campuses of buildings at his company's St. Louis headquarters. Gianino, like Patz, is in charge of a multivendor shop that includes multiple network types.

The Sierra Group's Gruhn, however, offers a cautionary note to those who would take a similar "erector-set approach." "If I were a user, I'd feel better if a vendor were accountable."

She also asserts that when vendors developed cabling systems, they looked 10 to 15 years into the future to determine what their products would need and designed their systems to accommodate future products.

But, Patz countered, his is a multivendor shop, and IBM, for example, makes no claim to support other vendors' equipment on its networks. He pointed out that Wang and DEC, being Massachusetts companies, will inevitably win some state government contracts because they are local companies. His responsibility, therefore, is to assure that many vendors' machines can run on these network.

As for possibly closing out options in the future, he said, "If one were dealing with the future, one would put fiber everywhere, but it would be the wrong fiber and it would be used according to a simple technology." Using an automotive analogy, he said, "If I could have any car, I would buy a Rolls Royce. But I can't afford it and I can't maintain it."

David Terrie, president of Newport Consulting, Inc. of Scituate, Mass., suggests vendors' wiring plans may not be as uniform as they seem.

However, "Vendors don't want to be locked out of a sale because of cabling," he said, explaining that they will look for ways to support any kind of cabling a user might have.

"You're going to see wiring plans that are much more flexible and support all the major standards," Terrie predicted.

Meanwhile some observers forecast an eventual migration to fiber optics in all applications, although they disagree as to how soon this will occur. They do agree, however, that fiber-optic cable will become more inexpensive and inventions will be made that overcome some of its disadvantages.

Gruhn said fiber-optic cable will not be inexpensive enough to use as other than a backbone in new buildings for another 10 to 20 years.

Fiber-optic cable has virtues that make it perhaps the optimal medium. It is not susceptible to nor does it create electromagnetic interference because it transports light and not electricity. Since much of the total light spectrum is available to it, optical fiber has the largest bandwidth and therefore the greatest information carrying potential of any medium available. According to AT&T, a ¼-inch optical-fiber cable containing two fibers can carry more information than a 3-inch bundle (900 pairs) of copper wire.

But fiber-optic cable cannot be tapped into by users who want to add workstations to a network. And to connect it to a workstation, an expensive multiplexer is needed to separate the different channels for the user. However, work is being done to overcome these deficiencies.

"Fiber-optic technology could ignite in the future because a number of companies are working to develop a breakthrough in technology to allow for tappable fiber-optic buses," Terrie said.

"In the future, there's no question you'll be able to tap in," Doyle offered.

Presaging what may become a widespread movement of Ethernet from baseband coaxial cable to fiber-optic cable, some companies are now offering fiber-optic Ethernets.

A peaceful coexistence?

But until the all-fiber world arrives, Doyle said, "Basically, you're going to see a coexistence of a lot of different types of wire."

Despite the fact that vendors and users may seem to be pulling in different directions, progress toward the goal of universal connectivity is being made, however haltingly. That both vendors and users need and desire it is clear.

Gibson is a senior writer for Computerworld *newspaper.*

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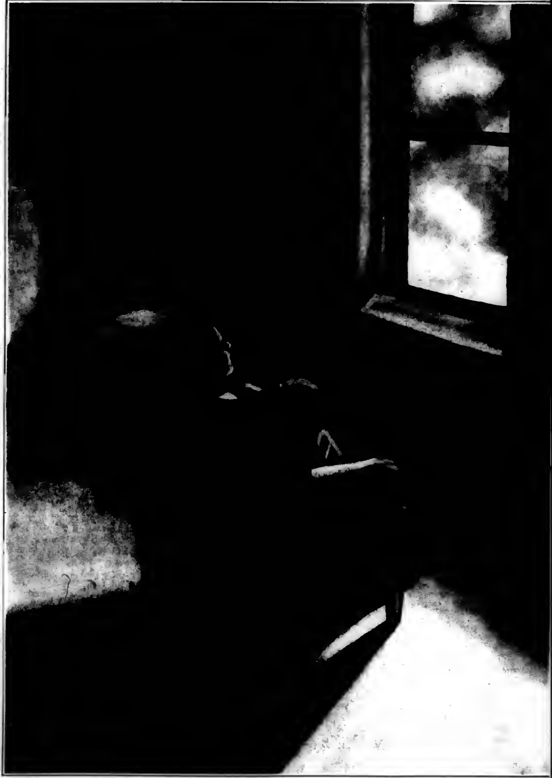

RALPH MASIELLO

Waiting For ISDN

• BY • JOSEPH • G. • SCHATZ •

Few in the telecommunications and MIS industry can fail to notice the heavy promotion of the Integrated Services Digital Network (ISDN) by vendors and carriers as a means of providing unusual new services at competitive prices, reducing network operational costs and enhancing corporate image.

One could reasonably conclude that much equipment is being designed and that extensive field trials are being scheduled by both local and interexchange carriers. The current situation was mirrored by the 1986 U.S. Telephone Association Showcases; these events displayed large selections of vendor equipment to promote, enhance and permit the implementation of ISDN and included seminars and talks on its features and benefits. The overall impression is that ISDN equipment is ready now, end users are demanding the services that it can provide and telephone companies are beginning large-scale ISDN implementation.

However there are some complications. International standards on which ISDN is based have not yet been totally agreed upon — either by the Consultative Committee on International Telephony and Telegraphy or by various constituencies within the U.S. This situation has prevented equipment designs from reaching final form. Additionally, numerous surveys indicate that almost all end users either know nothing about ISDN or are confused about what it can do for them. Finally, the divested Bell operating companies are introducing a plethora of advanced services that are not compatible with ISDN.

Because of the apparent contradiction between the feverish activity by vendors and carriers on one side and the lack of standards and available equipment on the other, Arthur D. Little, Inc. (ADR) surveyed the seven regional holding companies and their respective divested Bell operating companies.

In this survey, ADR interviewed key executives and reviewed the literature that each released to trade publications and the investment community. ADR investigated the following items:

- ISDN goals.
- Action plans for achieving those goals.
- End-user services and applications possibly provided by ISDN.
- Potential benefits to the carriers and their customers.
- ISDN implementation costs.
- General issues and concerns expressed by the telephone companies about ISDN.

The survey spanned a period of three months and was completed at the end of April 1986. Some of the findings concerning telephone company attitudes and the long-term implementation and use of ISDN were surprising.

At the completion of the survey ADR analyzed the responses — not only to compile basic information on ISDN field trials that will be conducted by the carriers but also to determine the underlying purpose of these trials.

The trials were grouped into four general categories:

- Digital demonstrations.
- Phased-introduction trials.
- High-functionality trials.
- Single-switch trials.

ADR described which companies are conducting trials, when and where the trials will take place (or did take place), the switching equipment to be used (or used), who the end-user was, who will be provided the service (if this information was available) and brief descriptive details.

In digital demonstrations a portable version of a central office switch gives subscribers an indication of the services and applications provided by ISDN. The first demonstration was held by Ameritech's Wisconsin Bell divested operating company in 1985. It used a Siemens AG of North America, Inc. EWSD trailer-based switching system to demonstrate a basic 2B+D Centrex interface. Another Ameritech company, Illinois Bell, will test the first full-scale installation of ISDN in the U.S., hosting a McDonald's Corp. trial in Oakbrook, Ill. This trial will provide Centrex service through a 2B+D interface via an AT&T 5-ESS.

A second regional holding company that conducted large-scale digital demonstrations is Bell Atlantic Corp., using a switching system provided by NEC Corp. and demonstrating Centrex-based services throughout its operating companies' service area. Again, the trial was based on the basic 2B+D Centrex interface and involved moving the NEC adjunct equipment to various locations.

The Pacific Bell and Southwestern Bell divested operating companies will be conducting phased-introduction trials. Although the details of each of these trials differ somewhat, the basic concept involves initial trialing of ISDN technology in small wire-center-based islands, interconnecting these islands via common channeling system (CCS) 7 and connecting these local networks to inter-Local Access and Transport Areas (LATA) and other networks such as packet-switching systems.

Additionally, Pacific Bell has been testing transmission techniques that might be used to supply pre-ISDN services. One specific technique, referred to as Project Victoria, began its trials on April 15; this proprietary transmission approach has not been described in the trade press because it may be patentable.

Both U.S. West and Bell South Corp. carriers will be conducting what ADR calls high-functionality trials. U.S. West carriers will different switching machines in island-type configurations to test ISDN local switching and transmission technologies. These switches will include Northern Telecom, Inc.'s DMS-100, NEC's digital adjunct, AT&T's 5-ESS and GTE Corp.'s GTD-5 EAX.

A U.S. West carrier is the only one planning field trials of the GTE switch and is also the only one using that switch to provide the 23B+D private branch exchange-oriented ISDN interface. Like U.S. West carriers, Bell South divested operating companies will use many switches in its trials, ranging from AT&T's 5-ESS to Siemens' EWSD.

Nynex Corp. is the only company conducting single-switch trials and it appears to be using only the EWSD central office switch. Here again, the 23B+D PBX-oriented interface will be tested. Recent indications are that Nynex is also considering the L. M. Ericsson AXE-10 local switch as a vehicle for ISDN trials. No formal announcement has yet been made by either Nynex or Ericsson.

The ISDN trial statistics and off-the-record comments by the divested Bell operating companies changed ADR's initial impression of the state of ISDN in the U.S. In particular, the regionals and their carriers, although publicly aggressive concerning ISDN, are privately very conservative. The local carriers are not investing heavily in ISDN-specific equipment — that is, transmission equipment to support the 2B+D or 23B+D interfaces in the local loop, ISDN Class 5 switches and signaling systems uniquely designed to support this new digital technology.

However, ADR did surmise from the numbers, extent and timing of the field trials that the vendors are spending large amounts to develop ISDN equipment. The divested operating companies *are* investing heavily in programs that put ISDN-support technologies in place but are not uniquely ISDN specific in regards to digital switching, various forms of digital transmission, multiplexing and fiber optics. While necessary for ISDN implementation, these technologies are not sufficient for its full implementation.

ADR's conclusions, based on operating companies' implementation plans, create an overall picture of the divested Bell carriers' activities rather than one that applies specifically to any individual carrier. Because of the confidentiality of ADR's interviews, the firm does not ascribe any of the following comments to a particular regional holding company, divested Bell operating company or individual.

■ **Conclusion No. 1.** ISDN is being implemented systematically to test the technology.

Contrary to the initial impression, ISDN is not undergoing widespread implementation in the U.S. Rather, it is being installed on a very judicious and conservative basis to test underlying technologies. Typical regional holding company approaches are summarized by the following two excerpts from the survey results:

- "The company's long-range plan . . . was not to make ISDN available throughout the region but only where there was significant demand"; "wary of the possibility of stranded investment resulting from an overly aggressive program"; "will not bet the company on it"; "key technology introduction to those areas of high demand"; "minimize upfront cost."
- "I think it will be a good 10 years before we see widespread ISDN."

Typical implementation programs were the logical and orderly phased-introduction approaches of Pacific Bell and Southwestern Bell, in which ISDN islands are created using switches from different manufacturers. The islands will later be connected via CCS 7 and finally interconnected to both inter-LATA and local packet networks.

■ **Conclusion No. 2.** ISDN is currently viewed as a technology aimed more at cost reduction than at meeting customer needs.

Although ISDN technology could be used to enhance the competitive position of the local exchange carrier or to increase its revenue through the provision of enhanced and special new services, ADR found ISDN primarily being implemented to reduce operational costs. Illustrative of this view are the following observations from the divested Bell operating companies:

- "ISDN is truly a technology in search of customers."
- "ISDN technology is definitely in the driver's seat, and the market has yet to be defined."

We did not find extensive needs identification, end-user applications analysis or primary market research being conducted by either the vendors or the regional holding companies and their divested carriers. However, many carriers indicated that a large amount of primary-market need research would have to be conducted prior to full-scale ISDN implementation.

Thus, a large majority of the trials are aimed at providing services internal to the divested Bell operating company network; that is, the local carrier uses this new technology to provide services to itself. Also, in many cases, these services were centered on a novel use of technology, as typified by the Project Victoria approach of Pacific Bell.

Costs were seldom discussed with ADR. However, it is said that the long-run incremental investment associated with ISDN could range from a low of $400 to a high of $4,000 per line. This variation demonstrates that ISDN's true cost will not be known until final standards are established and implementation is more widespread.

■ **Conclusion No. 3.** The introduction of services uniquely based on ISDN technologies will be slow.

The following observations best summarize the implementation of services based on ISDN:

- "I'm up in the air on ISDN. I don't know if there is a market. . . . What kind of features will it deliver, or who will buy it? . . . We will stand back and watch what develops. You'd think there was more to ISDN. I really think there is lot less there than the press would have you believe."
- "I feel that we can piece together a service we can sell."

When ISDN-based services arrive, ADR said the provision of business-type services will receive the most emphasis. These services will be centered on Centrex delivery and will use the 2B+D interface. As highlighted earlier, only two divested Bell operating companies are testing the PBX-oriented 23B+D interface. This emphasis on business services is consistent with the carriers' long-term competitive plans to use Centrex as their primary vehicle for competing with both customer premises-oriented communication solutions and bypass.

■ **Conclusion No. 4.** The carriers have many concerns about ISDN, other than who will buy the services.

These concerns can be grouped into the following four categories:

Standards. Probably the most important concern is in the area of standards. Vendors cannot manufacture final equipment until specific customer premises equipment (CPE) and transmission standards are set, both on the international scene and in the U.S. Take into account the following comment:

"In the absence of standards, manufacturers are going to have to build CPE for individual machines. . . . We are working hard on the standards committee to develop a CPE network standard, but we don't expect one to emerge before 1988 at the earliest."

Software. Software concerns are many and deep. In general, the carriers do not want to be totally dependent on any one switching manufacturer's proprietary software.

Activities to reduce this dependence are typified by the feature node/service node concept introduced by Ameritech and currently being investigated and expanded by Bell Communications Research Corp. In this concept, specific nodes are being set up. Software needed to implement specific customer applications and services is resident in these nodes. This tool may be developed by any vendor and downloaded as available to specific Class 5 switches.

Customer premises equipment. The situation with CPE differs from that of switching machines. In the case of local switching, vendors actively pursue the divested Bell operating companies for field trials. However, in the case of CPE, the divested carriers must issue requests for proposals to obtain CPE for their ISDN implementation trials. Much of the problem centers on the fact that CPE standards have not yet been developed. Particular areas of concern include the ownership of network channel terminating equipment and the specific encoding technologies that will be used on the digital subscriber lines between the Class 5 office and the network channel terminating equipment.

Regulation. Although regulation, in terms of the restrictions placed on the divested carriers by the Federal Communications Commission's Second Computer Inquiry and the Modified Final Judgment, hinders the provision of value-added network services, only one divested Bell operating company mentioned regulation and its associated uncertainties as being a major problem in providing ISDN.

Since the ADR survey was completed, major regulatory changes have occurred. The FCC's Third Computer Inquiry ruling opened the door for the provision of ISDN intelligent services by both the interexchange and local exchange carriers. ADR said that the remaining restrictions on local exchange carriers, based on the Modified Final Judgment handed down by a federal court in the AT&T antitrust suit, will eventually be removed. Other areas relating to Computer Decision III must still be clarified, notably the question of who will own the network channel terminating equipment.

Having completed the divested Bell operating company survey, ADR stated that local exchange carriers are treating ISDN as another in a series of technologies being introduced into the network to make its operation more efficient and cost-effective. Other technologies in the series have included analog common control switching, digital transmission and fiber optics.

Residential service in the year 2000?

Nevertheless, services uniquely based on ISDN technologies will probably be a long time in coming. Areas such as business services will be the first affected by this new technology. Users probably will see business-type services becoming available on a large scale by the early 1990s. However, ISDN technologies are unlikely to support residential services on a large scale until after the year 2000.

The state of ISDN implementation is dynamic and will change as more equipment becomes available from vendors. Bell South, for example, has just introduced its new transmission technology called VAD-9600, manufactured by Lear Siegler, Inc. Bell South has also identified some end-user customers who will participate in its trials. Ultimately, Nynex will expand its single-switch (EWSD) approach through negotiations with Ericsson to incorporate the AXE-10 in its field trials. Thus, the ISDN situation is extremely fluid; from a business perspective, it requires close monitoring.‡

Schatz is senior telecommunications consultant at Arthur D. Little, Inc. based in Cambridge, Mass.

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Shearson Lehman Builds A Network Alternative

· BY · STAN · KOLODZIEJ ·

Shearson Lehman's hectic trading pace demands the flexible, cost-effective solution a universal cabling scheme provides.

Despite all the talk about local-area networks (LAN) in the past few years, some corporations have not been swayed. LAN vendors have been facing a tougher set of customers lately, and not all of them are willing to accept the rhetoric of LANs as the panacea for corporate data communications ills.

Shearson Lehman Brothers, Inc., the New York-based brokerage and investment subsidiary of American Express Corp., is one firm that has taken a different tack with LANs. Instead of relying on LAN vendors to install numerous networks, Shearson Lehman has opted to put in IBM's token-ring cabling medium and handle much of the networking topology and interface technology in-house. What the company got in return was a universal cabling scheme that it finds more flexible and cost-effective than packaged LANs.

Jack Owens, senior vice-president at Shearson Lehman, explained that the firm reached the point a few years ago where it had to make a decision regarding the viability of LANs and cabling systems for the company's American Express (Amex) Tower facilities and the new eight-story Shearson Lehman Information Systems Center building about to be constructed, both in Manhattan.

"We were really into a ramp-up phase with our computer systems," Owens said. "Like others, we were waiting for IBM to introduce its LAN system, and we were looking at other LAN vendors. We were part of that whole group of companies that, at the time, said that LANs and fiber optics were the direction of the future."

At a certain point, however, Owens said he and his colleagues at American Express and Shearson Lehman pulled back and took a second look at LANs. They realized that there were a tremendous number of terminals in-house that didn't talk to one another, nonintelligent devices connected back to the host mainframes.

"We decided that we did have some needs for LANs," Owens explained, "but we weren't about to wire an entire building based on a few discrete requirements that existed then but might not exist in the future."

Owens said they were also aware of some inherent limitations that changed their opinion of LANs as the universal data communications solution.

"LANs are an expensive way to distribute information. In addition, error recovery is difficult, and there are management problems with large-scale networks," Owens explained.

"When this was happening two years ago, there wasn't one clear-cut LAN winner or one clear-cut standard. There wasn't even a clear-cut standard on fiber. We looked at the situation and said, 'We're waiting for IBM, for Ungermann-Bass, for 3Com [Corp.] and all these other people' and decided that if we went with these people, we'd have a high probability of making the wrong vendor choice because there might be a shakeout later and they had different properties and different uses depending on what we wanted to do."

Owens had also discovered, speaking with people in the industry, that the average number of workstations supported by LANs was about five, with few existing LANs running 100 workstations or even 40 or 50 workstations.

"We were looking at 8,000 workstations at the Amex Tower and 1,200 stations at the Information Services Center," he explained. "You don't decide to wire all that on the promises that LANs might not deliver. We also thought, however, that if we didn't do something, we'd miss a tremendous opportunity in integrating LAN technology up front in our new building. There was a trade-off."

Although Owens said that LANs are going to be a vital part of the communications distribution function, he said that at the time, they didn't fit into the company's requirements of a medium that had some real benefits in payback and could form a communications distribution system with the ability to let the company grow and use it as a LAN in the future. Instead, the firm opted to install IBM's token-ring cabling medium.

In the meantime, Shearson Lehman had indeed been ramping up. The data processing department has risen from 200 employees and dual IBM 158s in 1979 to nearly 900 employees, one IBM 3090 and three 3084s today.

The company's IBM 3090s and 3084s, which form the core of its centralized DP operations, will be housed, along with data processing, communications and support staff, in the new Information Services Center scheduled for occupancy in the fourth quarter of 1986.

Shearson Lehman's data communications needs have grown apace. Worldwide communications is handled through long-distance leased lines and satellite transmission to Europe. Up until 1979, data communications was handled by a Control Data Corp. mainframe and then converted to an IBM system, while the number of terminals throughout the corporation climbed from 300 to its current number of 13,500 worldwide.

Owens said the firm uses a large number of Quotron terminals using IBM 3270 emulation over Quotron networks. Effectively, every one of the company's financial consultants has a terminal that is plugged into host mainframe data bases. Company stock traders are also using a video switching system over fiber-optic cable.

Trading demands resources

"Any company involved in building new facilities for its traders is making large investments in communications," Owens explained, claiming that supporting trading activities is one of the most demanding areas for any financial services company.

"The trader has a whole bank of telephones in front of him," he explained. "He has a keyboard that allows him to get into several data acquisition services, some internal, some external. He needs the 3270 emulation because a lot of what he does is sophisticated trading activities running on our mainframes for processing trades and orders. Probably the largest communications demand of any single workstation that I've run across is in a trading workstation, both in data and work displays."

Even so, Owens said that regardless of the large number of communications lines and terminals, the company's trading activities represent only a portion of the overall business and only a portion of the hundreds of data communications circuits it has installed.

Three microwave links are being used between the company's buildings in Manhattan over distances of six to eight blocks. Though they are not being used to bypass the local telephone company lines to get into long-haul circuits, Owens said, that is an area the firm is definitely interested in. Satellite links connect the New York offices with the West Coast and Europe.

The company has also installed three small local-area networks supplied by Proteon, Inc., Novell, Inc. and 3Com that range in size from 10 to 60 users and that connect a portion of the estimated 1,000 IBM Personal Computers scattered throughout the company. A Wang Laboratories, Inc. Wangnet broadband cabling system was installed in the Amex Tower to handle data communications among Wang systems. Owens described it as a possible overkill situation compared with baseband networking but efficient for networking within the Wang environment.

Bolstering all of this is the bottom line, and in Shearson Lehman's case, the bottom line has been solidly black. The company reached an estimated $3.2 billion in revenue in 1985, registering about $350 million in pretax profits.

The IBM Cabling System, more than two million feet of it, has become the backbone of nontrading activities at Shearson Lehman. Before installing the cable, however, Owens and his colleagues had a lot of work to do. They conducted Monte Carlo-type simulations forecasting many possible combinations of workstations and cabling from computer vendors, trying to come up with the right scenarios, systems and cabling while trying to avoid removing existing cabling.

"The more we modeled and simulated the process of change," Owens explained, "the more it became apparent that a tremendous cost and labor benefit would accrue to the company if we could come up with a universal cabling scheme.

> ***'LANs are an expensive way to distribute information. In addition, error recovery is difficult, and there are management problems with large-scale networks.'***
>
> **— Jack Owens**
> **Shearson Lehman Brothers, Inc.**

"It's much more cost-effective to wire the right way initially and avoid going back and doing it later. If you have one office that has Wang cable and the next office is wired with coax for an IBM 3270, and you want to move the people or change the function, you have to rip out and re-lay it. That's where the real costs come in — later, when you have to redo it. During the past two years a funny thing has happened: Terminal prices have come down below $1,100 while on the average it costs in the area of $3 a foot to install the wiring," Owens said.

"It's very easy to get into situations where the wiring costs more than the terminal it supports. The IBM cabling scheme was a good decision for us on hindsight."

Though Shearson Lehman began installing the 16M bit/sec. IBM cable at the Amex Tower in 1984, there were other problems to be straightened out first.

"We went out and bought the coax and engineered patch panels, patch cords and interface modules to run on it," Owens explained. "Then we got involved with some of our own engineering to get Wang and other vendors certified to run on it. The cable was also integrated for both data and voice, with IBM offering a voice/data solution in the same vinyl jacket."

Shearson Lehman's engineering was significant to the entire cabling scheme.

"Part of the key was trying to get non-IBM vendors to run on the Cabling System," Owens explained. "Wang said they weren't sure whether they would or could support the cable, and so we analyzed Wang's requirements and the Cabling System ourselves, then engineered an interface mechanism. Wang then went through the same process, came up with a similar solution and said they would support it. We then had people construct the interface assemblies.

"The IBM cable was the only medium we could find that could run the largest number of devices, both IBM and non-IBM. On top of this, it's a LAN medium and gives us the opportunity to use it as a LAN medium in the future," he said.

Owens said Shearson Lehman engineers spent a good deal of time installing the cable with IBM, the physical diameter of the IBM cable being larger than regular coax. None of these problems, however, were insurmountable.

"When you look at cabling systems, you get into some interesting geometries," Owens explained. "You start dividing the world into horizontal and vertical cabling issues. We found that horizontal is more permanent, more costly and more difficult to change and enlarge than vertically installed systems. Yet we went with a horizontal scheme because we found it more cost-effective when installed during the construction of a new building. The fact that we won't have to re-lay cable will offset costs."

Owens said reconfiguring workstations is easy. Communications closets, containing patch panels and serving as control points for the cable, have been installed at various points in the buildings.

"We can take the cable and put it on an IBM controller. We could connect somebody to a LAN, or we could take a user and put him on a Wang system," he explained. "If they want to move, all we have to do is change the patching configuration in the closet. We can connect file servers or anything else we want. It doesn't matter if we need three or 100 workstations networked in a particular area. We're running LANs which we never envisioned, all running on a star topology."

The other half of the equation

Voice communications is the other half of the equation. Programmable, intelligent private branch exchanges from AT&T have been installed to provide software-controlled voice communications for users on the cable.

"We put in intelligent PBXs to maintain control," Owens said. "It works on the same principle as our data communications. We can move people and change features and functions under the software. These are three-node, 16,000-line System 85s, one at the Amex Tower and another in the Information Services Center."

High-speed T1 data communications links will tie the center into other Shearson Lehman facilities in Manhattan. These broadband T1 lines are being purchased from Nynex Corp. and will be multiplexed into multiple data communications channels. At this point, the company is using copper T1, which is further bolstered by microwave links.

Though Owens said the Cabling System has cost Shearson Lehman several million dollars, the company is expecting its payback within the next 3½ years.

"And that's for a conservative growth projection. If we stay on the kind of rapid growth path that we've maintained during the past few years, we'll recoup costs even sooner."

With an eye to the future, Owens said, Shearson Lehman will be implementing IBM's LU 6.2 peer-to-peer communications protocol.

"We're thinking of using it to interface [IBM] PC LANs back to host mainframes," Owens explained. "We're also looking to integrate [IBM's Professional Office System] into our Wang systems. We don't do a lot of what I would call data processing, and for office systems support, especially heavy word processing, we'll probably stay with Wang and IBM."

Owens added that he and his colleagues will also keep a close watch on LAN industry developments.

"Our Proteon network is token ring," he explained, "and we think token ring will be a long-term player in the LAN environment. Now that we've made our commitment to a universal cabling scheme, we can effectively test and implement any one of the technologies we want." ■

Kolodziej is a Computerworld Focus *senior writer.*

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2	22	42	92	92	139	122	142	162	122	202	222	242	362	202	302	323	342	382	382
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IBM Network Products Debut

RYE BROOK, N.Y. — IBM recently announced a series of networking products to facilitate data exchange among some of its low- and high-end computer lines.

The first is a series of software products allowing IBM Personal Computers to exchange data with IBM 370 host processors and provide access to resources on these processors.

The 370-to-PC Enhanced Connectivity Facilities includes tools that give PC users access to host files, disk space and printing facilities. The menu-driven programs also allow users of IBM PCs and 3270-PCs to query and extract data from hosts, transfer files between hosts and PCs and issue host commands from a PC.

IBM said these products include requesters of data and services on the PCs, servers of data and services on hosts and routers of data and services between hosts and PCs. The Enhanced Connectivity Facilities work with 370 host processors running MVS/XA with TSO/E and VM/SP operating environments. IBM PCs, PC XTs, ATs and 3270-PCs are supported. Through the new programs, IBM said, users have access to information stored in many host data formats without having to understand how host files are named.

File transfer capabilities include automatic transfer of data between host formats and PC formats and the ability to select information by record or field.

The IBM PC Requesters product costs $450. The IBM TSO/E Servers program has a monthly license charge of $1,350, and the IBM CMS Servers program has a monthly license charge of $850.

IBM also introduced three adapter cards for its RT Personal Computers, giving the units high-speed communications and allowing them to be connected to Ethernet and IBM Token-Ring local-area networks (LAN).

The IBM RT PC baseband adapter card permits RT PCs to be connected to Ethernet LANs. When used with the IBM RT PC Transmission Control Protocol/Internet Protocol program, the adapter permits users within a building or department to share files, applications and printers.

The IBM Token-Ring Network RT PC adapter card allows RT PCs to be connected to the IBM Token-Ring Network and contains a microprocessor with microcode that lets users write application programs for such services as mail, file transfer and networking.

The IBM multiprotocol communications adapter card lets a variety of devices communicate remotely with RT PCs over telephone lines through modems using asynchronous, binary synchronous, IBM Synchronous Data Link Control, High-Level Data Link Control and X.21-type communications protocols. An Intel Corp. 80C51 micro controller chip in the card allows users to write microcode and programs so that devices can be operated in a network with 370 computers.

The IBM RT PC baseband adapter card and the IBM RT PC multiprotocol communications adapter are priced at $850 each. The Token-Ring Network RT PC adapter card is priced at $1,095.

For further information, contact IBM, Information Systems Group, 900 King St., Rye Brook, N.Y. 10573.

Circle Reader Service Number 273

DEC Unveils Asynchronous Server

The Decserver 200 terminal server offers users connections to one or more machines on an Ethernet local-area network.

MAYNARD, Mass. — Digital Equipment Corp. has introduced the Decserver 200, a network terminal server that provides asynchronous connections for as many as eight terminals, printers or personal computers to DEC's line of VAX computers as well as modem control and connections to other vendors' equipment running on Ethernet.

The network terminal server is available in two versions, the Decserver 200/MC and the 200/DL. The Decserver 200/MC uses industry-standard RS-232C signaling and offers logical connections to non-DEC computers through Ethernet connection and protocol support. Incorporated modem control features allow modems — as well as devices requiring modem control signals — to be connected to the terminal server, giving users in remote locations access to resources on the local-area network.

The Decserver 200/DL uses the DEC-423 signaling standard and is suited for use with the vendor's Decconnect system. The company said that support for the DEC-423 standard allows for greater distances between terminals and the terminal server, up to 1,000 feet. The Decserver 200/DL can also be placed in a Decconnect satellite equipment room, enabling the server to be located within a user's facility.

Both versions of the Decserver 200 offer additional support for multiple sessions, on-line Help, status and performance monitoring and intraserver communications. DEC said its server can support up to eight multiple sessions per user, allowing users to move from one application to another without repeating login procedures each time.

The company also said that status and performance monitoring of the server allows traffic patterns and peak-load conditions to be monitored more easily. Intraserver communications allows two devices connected to the same Decserver 200 to communicate directly through the terminal server, reducing communications traffic on the Ethernet network.

The Decserver 200/MC costs $3,450, and the Decserver 200/DL costs $3,050. The software license is $50 for either.

DEC also introduced the Remote System Manager (RSM) distributed system management software that the company claimed makes managing a network of DEC Microvax II systems and Vaxstation II workstations almost as easy as managing a single system. With RSM, the company said, a central system manager can perform tasks such as installing software, providing software updates and making backup copies of files, freeing users from performing system management at each separate, distributed system.

Under RSM, a server system performs system management functions for other "client" systems in an Ethernet local-area network. The server can be a VAX or Microvax II system running the RSM server software, and the clients are Microvax II systems and Vaxstation II workstations running RSM client software.

DEC said the number of client systems supported ranges from a minimum of five Microvax II systems, when the server is a Microvax II, to a maximum of 40 Vaxstation II workstations when the server is a VAX 8600 or 8800 series computer.

RMS server software is priced from $1,500 for the Microvax II to $7,500 for the high-end VAX 8800. Client RMS software is priced at $300 for a Vaxstation II and Vaxstation II GPX and $900 for the Microvax II system. For more information, contact Digital Equipment Corp., Maynard Mass. 01754.

Circle Reader Service Number 274

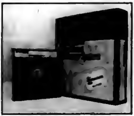
LAN Performance Test Offered

LENEXA, Kan. — Innovative Software, Inc. has announced Smart local-area network (LAN) Performance Test (LPT) that enables users to compare the performance of LAN systems in a simulated working environment.

The Smart LPT is built around Innovative Software's Smart Software System, which includes a data base manager, a spreadsheet with business graphics, word processing, communications and application programming language. The Smart LPT may be used on any IBM Netbios and Microsoft Corp. MS-DOS 3.1 or higher compatible local-area network operating system.

The firm said the Smart LPT is menu driven. The tester individually selects the data base, spreadsheet or word processing application to be run on each workstation as well as the level of usage — low, medium or heavy. The application selected runs on a loop on each workstation until the tester chooses to stop. The tester then selects the Control Test option and the LPT performs timed tests using the Smart Software System. The tester may also run the LPT on a single-user IBM Personal Computer or compatible to establish a base line timing for comparison. Then the Smart LPT generates a test data disk to be used later for reporting.

The company added that results of several tests may be consolidated into one graph for comparison by time in seconds or according to a single number rating.



Smart LPT compares LAN systems in a simulated working environment.

The Smart LPT is priced at $49.95. For further information, contact Innovative Software, Inc., 9875 Widmer Road, Lenexa, Kan. 66215.

Circle Reader Service Number 275

Okidata Announces Three 9.6K Bit/Sec. Modems

MT LAUREL, N.J. — Okidata Corp. has introduced three new 9.6K bit/sec. modems targeted at existing and start-up communications networks.

The three models, the CLX96 (point to point), CLX96FP (multidrop) and the CLX96M (multiport), were designed, according to the company, to ensure signal integrity during synchronous operation (in half- or full-duplex mode) over most four-wire, dedicated-type 3002 unconditioned transmission lines.

Each model provides automatic adaptive equalization through a microprocessor-based equalizer that continually compensates for varied line conditions. Automatic adjustments are made to incoming signal levels enabling distortion-free data to reach data terminal equipment. The CLX series modems also offer built-in diagnostics for fault isolation.

Okidata added that the modems provide local analog and remote digital testing for unattended loopbacks to isolate error conditions at key points within a network. Also incorporated is a 511-bit pseudo-random-pattern generator that, when used in conjunction with loopback tests or end-to-end tests, permits testing of an entire communications link.

Other features include a fast polling facility with the CLX96FP that adapts to line conditions and a four-port buffered multiplexer in the CLX96M that allows up to four terminals to share a common dedicated line.

Prices for the CLX96, CLX96FP and CLX96M are $1,445, $1,995 and $2,195, respectively.

For more information, contact Okidata Corp., 532 Fellowship Road, Mt. Laurel, N.J. 08054.

Circle Reader Service Number 276

Lotus TAC Software Out

CAMBRIDGE, Mass. — Lotus Development Corp. announced The Application Connection (TAC), a line of mainframe and micro software that provides connections between corporate data located on a mainframe and the personal computers of corporate end users.

TAC, however, is not a micro-to-mainframe link, according to Lotus. Rather, it is software that extracts information from an application, automatically reformats it into a standard form (a "transfer data base") that contains the specified data along with a dictionary of critical information about the data. From this transfer data base, TAC then translates the data into the appropriate PC or mainframe format.

In fact, TAC makes use of customers' existing micro-mainframe links to move data between systems, the vendor said.

TAC supports mainframes running under the IBM VM/CMS or MVS/TSO. Mainframe software products supported by TAC modules include Martin Marietta Data Systems Ramis II; Information Builders, Inc. Focus; SAS Institute, Inc. SAS; D&B Computing Services, Inc. Nomad2; as well as standard QSAM and CMS file formats.

At the micro level, TAC PC components will run on Personal Computer XT, AT or Lotus-certified compatible computers with at least 192K bytes of memory.

TAC is compatible with any standard communications link and with leading communications emulation boards.

Pricing for standard TAC mainframe modules is $10,000 for VM TAC and $13,000 for MVS TAC. A basic personal computer-resident model, PC/TAC, is priced at $180 per personal computer. Optional modules for fourth-generation mainframe data base modules are priced from $8,000 to $10,000. Optional personal computer modules cost less than $100 each.

Modules for Lotus' 1-2-3 and Ashton-Tate Dbase will be available initially, while modules for Lotus Symphony will be available later this year, the company said.

For further information, contact Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, Mass. 02142.

Circle Reader Service Number 277

Banyan Releases Connectivity Tools

WESTBORO, Mass. — Banyan Systems, Inc. announced support for the IBM Token-Ring Network PC Adapter and Adapter II, the Banyan/DTS desktop server and the Vines/286 conversion software.

Banyan offers adapter boards that allow its servers to connect to a Token-Ring Network. These boards fit into a Banyan server's IBM Personal Computer-compatible bus. The cost of the Token-Ring adapter is included in the server price because Banyan provides one local-area network support board with each server. If a customer wants Token-Ring support in addition to another type of LAN support, the board costs $1,000. The adapters will be available in October.

The Banyan/DTS network server was designed to provide file and peripheral sharing and communications capabilities for small to medium personal computer clusters. It supports consecutive-byte direct memory access transfers, making its throughput capacity twice that of a standard IBM PC, Banyan claimed. The Motorola, Inc. 68000-based server will initially be offered with one 43M-byte, 72M-byte or 118M-byte hard disk drive that can be upgraded to two drives.

A base configuration of the Banyan/DTS, including 1M byte of memory, a 43M-byte hard disk, 60M-byte tape and Banyan's Vines network software, is priced at $9,995. Banyan began shipments in August.

Vines/286 turns PC ATs into multifunction network servers.

Vines/286 is a software package that converts an IBM PC AT or compatible into a multifunction network server that is compatible with the Banyan/BNS and Banyan/DTS servers.

Requiring a minimum of 512K bytes on the PC AT, Vines/286 offers complete access to network resources and network applications such at Banyan Mail. Like Banyan's network software, Vines, Vines/286 also includes Streettalk, Banyan's global data base.

Vines/286 costs $1,895 and is delivered on diskette. It will be available in October. For more information, contact Banyan Systems, Inc., 135 Flanders Road, Westboro, Mass. 01581.

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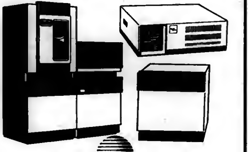

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Fault-Detection Switch Bows

MOUNTAIN VIEW, Calif. — Sytek, Inc. has introduced the 2555 Translator Switch, a local-area networking device that allows fail-safe head end operation of Sytek's System 2000 product line for large-scale networks.

The 2555 Translator Switch resides at the head end of Sytek's System 2000 programmable control unit where it is connected to two Sytek 2550 network translator units. If the 2555 detects a fault in the on-line translator unit, it automatically switches operation to the backup translator unit. Sytek said that fault detection and switching occur in 100 msecs with no detectable interference to the user and no network data loss.

The 2555 automatically alerts the network manager when a fault is detected in either of the two translator units by beeping and illuminating a warning light. The device is also self-monitoring, taking itself out of operation in case of a fault. Sytek claimed that use of the 2555 in a Sytek local-area network improves reliability by a factor of 10,000.

The 2555 Translator Switch is priced at $4,000. For further information, contact Sytek, Inc., 1225 Charleston Road, Mountain View, Calif. 94043.

Circle Reader Service Number 279

Ashton-Tate Unwraps Link

TORRANCE, Calif. — Ashton-Tate has introduced a micro-to-mainframe link that enables data exchange between the company's Dbase II, Dbase III Plus and Framework II data base management software and Comshare, Inc.'s System W decision support software.

The software link, a joint development and marketing effort between Ashton-Tate and Comshare, is based on Comshare's W/Information Gateway and is interactive, allowing data to be both downloaded and uploaded between Ashton-Tate's micro software and a System W host data base.

Because the product also uploads data, it reportedly gives users the ability to collect and edit data using Ashton-Tate products then copy it to a mainframe data base for use in reports. These reports and data from Ashton-Tate's software can then be shared with other users through an interface with Comshare's Commander EIS, which is said to create a workstation environment for sending and receiving finished reports and charts to end users from a variety of mainframes.

The new release of W/Information Gateway requires an IBM Personal Computer XT, AT, IBM 3270 Personal Computer or compatibles with 512K bytes of random-access memory. The product supports coaxial communications using Digital Communications Associates, Inc.'s Irma board, an IBM 3278/3279 board or Forte Communication Co.'s PJ board. Asynchronous communications is supported with Hayes Microcomputer Products, Inc.-compatible modems.

The product costs $450. For further information, contact Ashton-Tate, 20101 Hamilton Ave., Torrance, Calif. 90502.

Circle Reader Service Number 280

Network Interface Unit, Monitoring Tool Debut

WAKEFIELD, Mass. — Applitek Corp., a company specialising in local-area network (LAN) technology, has introduced the E110 network interface unit and the Network Management System (NMS).

The E110 network interface unit enables Applitek users to build facility-wide networks combining the company's Unilink protocol, which serves as a high-throughput backbone network, with lower cost carrier-sense multiple access with collision detection standard subnetworks.

E110, which uses IEEE 802.3 standard network protocols, interfaces four or 10 terminals using asynchronous or synchronous protocols through RJ-45, RS-232 or RS-449 interfaces. It operates at 10M bit/sec. on broadband, baseband and fiber-optic networks that use Applitek's fiber-optic tap.

E110 is priced from $310 per port.

NMS monitors and controls interconnected LANs and has a range of security options. Beyond the basic techniques of using passwords and an operator's identification to log onto a network, NMS can give users access on a port-by-port basis, according to Ashraf Dahod, Applitek chairman and chief executive officer.

NMS runs on a multitasking Digital Equipment Corp. PDP-11/73 or Microvax II with at least 1M byte of memory. The computer's operating system should be either RSXII or VMS and it should support the DEC Record Management Service for data management. Additionally, NMS requires a dedicated NI10T network interface from Applitek to connect the micro running NMS to the network. The core NMS system starts at $20,000.

For further information, contact Applitek Corp., 107 Audubon Road, Wakefield, Mass. 01880.

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CALENDAR

Sept. 16-19, Boston — **Logical and Physical Data Base Design.** Also being held Nov. 18-21, Chicago. Contact: Software Institute of America, Inc., 8 Windsor St., Andover, Mass. 01810.

Sept. 17-19, Washington D.C. — **Introduction to Data Communications.** Also being held Sept. 29-Oct. 1, Boston; Oct. 8-10, Atlanta; Oct. 20-22, San Francisco; Nov. 3-5, Dallas; Nov. 12-14, New York; Dec. 3-5, Washington D.C.; and Dec. 8-10, San Francisco. Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

Sept. 24-26, Cleveland — **Data Communications.** Also being held Sept. 29-Oct. 1, Albany, N.Y.; Oct. 6-8, San Jose, Calif.; Oct. 15-17, Miami; and Oct. 22-24, Raleigh, N.C. Contact: Center for Advanced Professional Education, Suite 110, 1820 E. Garry St., Santa Ana, Calif. 92705.

Sept. 29-Oct. 1, San Francisco — **Systems Network Architecture.** Also being held Oct. 27-29, New York; Nov. 3-5, Dallas; and Dec. 1-3, Washington, D.C. Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

Sept. 30-Oct. 1, Chicago — **Information Systems Planning in an Environment of Changing Technology.** Also being held Oct. 15-16, San Francisco; and Nov. 18-19, New York. Contact: International Data Corp., Suite 240, 1500 Planning Research Drive, McLean, Va. 22102.

Sept. 30-Oct. 3, San Francisco — **Supercomputers and AI Systems.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402.

Oct. 2-3, San Francisco — **Capitalizing on Telecommunications.** Also being held Nov. 6-7, Washington D.C. Contact: Systems Technology Forum, Suite 150, 10201 Lee Highway, Fairfax, Va. 22030.

Oct. 6-9, New York — **Information Management Exposition and Conference.** Contact: Cahners Exposition Group, P.O. Box 3833, 999 Summer St., Stamford, Conn. 06905.

Oct. 7-9, New York — **Computer & Communications Security '86.** Contact: Cahners Exposition Group, P.O. Box 5060, 1350 E. Touhy Ave., Des Plains, Ill. 60017.

Oct. 7-10, San Francisco — **Dexpo West '86 Show.** Contact: Expoconsul International, Inc., 3 Independence Way, Princeton, N.J. 08540.

Oct. 9-11, San Francisco — **Desktop Communications: Fantasy or Reality.** Contact: The Seybold Group, Inc., Suite 132, 20695 Western Ave., Torrance, Calif. 90501.

Oct. 13-17, Tokyo — **Cadmex USA '86.** Contact: U.S. Export Development Office, American Embassy, APO San Francisco, Calif. 96503.

Oct. 15-17, Washington, D.C. — **Federal Office Automation Conference.** Contact: Federal Office Automation Conference, P.O. Box N, Wayland, Mass. 01778.

Oct. 20-22, New York — **Unix Expo.** Contact: National Expositions Co., Suite 12A, 49 W. 38th St., New York, N.Y. 10018.

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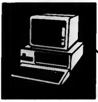

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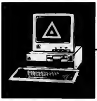

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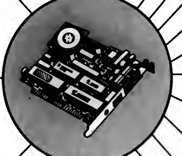

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